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JANUARY

1958

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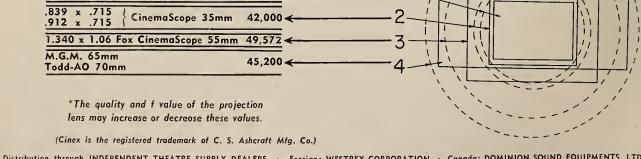
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Monthly Chat

Playing with Blocks

BLOCKS, all kinds, have figured in the motion-picture business lately to start off what may be a weird year:

A number of blockbusters have been released to what so far has been socko business. This, of course, is nice to see—but it would be nicer to see some orderly release instead of the annual holiday glutting.

Some 11,000 teen-agers lined up for a couple of blocks in front of the New York Paramount to see a rock 'n' roll show. It was the longest line in the history of the theatre, and one of the longest ever on Broadway, requiring the restraining influence of 100 policemen.

The kids' parents were over lined up in front of the Music Hall, where they let in 24,000 in a single day. The Paramount grossed over \$185,000 for the week, the Music Hall a record \$225,000. And these weren't the only blocks that were lined throughout the country.

Just why all this sudden rush, or how long it will last seems to defy most theories—with the possible exception of one: if you give 'em what they want, you can get 'em in.

Mr. Silverman Opines

But out in Chicago, Edwin Silverman, president of Essaness Theatres Corp., was putting the blocks to this industry. Calling a special press conference, Silverman predicted that "all major Hollywood studios engaged in production of motion pictures for theatres, with the possible exception of one, will close within the next six months." Silverman said he based all this on observation and discussion with industry leaders.

We would like to know to whom Silverman talked. And why it is that we have recently received a communication from the Association of Motion Picture Producers that states that Hollywood will make more pictures in 1958 than in 1957 or in several preceding years.

For example, Paramount will have 32 pictures for release in 1958, of which 18 are already completed; 20th-Fox has added another five million dollars to its sixty million dollar production budget for 1958 to be expended on 65 or more pix. United Artists' schedule calls for 16 blockbusters this year, and a record 24 for 1959 (more than six months away). Universal-International's schedule is for 39 features, Walt Disney, who usually has an average of two, will have five . . . and so on, but we haven't space here.

The Large "But"

We do not doubt Silverman's sincerity, but we doubt his accuracy. We do not think the studios are going to shutter

But—no matter how much product is turned out, it's got to be something the public wants to see, and hears about. DeMille has been mixing Barnum and the Bible for years and making money.

One more block: that's the mental block that afflicts those producers who are considering selling post-1948 pictures to TV. As if pre-1948 product hasn't clobbered the theatres enough.

Anyway, the year got off to a rousing start.

A pair of longlongstanding favorites



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Number 1

Preliminary Equipment Inspection

By ROBERT A. MITCHELL

"Not only must the show go on, but it must go on right"; in this and a subsequent article those points which are in danger of neglect by projectionists will be limned.

THE TECHNIQUE of professional projection involves a special kind of artistry as well as technical knowledge and skills; and the *art* of projection requires an enhancement of the dramatic values present in theatre films.

The projectionist's creative opportunities although limited, are important. He may contribute to the emotional effect of a film by "setting the mood" with lights and music before the show, and he may amplify the impression of a truly professional theatrical preformance by the way he handles intermissions and subject changes.

Once the picture is on the screen, however, the dramatic values created in the studio are best enhanced by straightforward technical perfection in presenting the film. The projectionist is thus unable to make a good film out of a bad one, but he can increase the effectiveness of a good film.

One of the characteristics of projection as an art is that the intent of the producer of a film, no matter what that intent may be, is always best served by technically flawless projection. This was true during the first forty years of theatre motion pictures, when the

screen was primarily an unobstrusive medium for transferring mood and feeling in a truly artistic sense, and it is equally true today, even though the screen, by becoming more "realistic," has lost most of its original subtlety and emotional force.

The projectionist is nevertheless still required to present even the "stagiest" CinemaScoped and Technicolored goings-on with the same meticulous care that he used in bygone years when the movies had more of the sensitivity, beauty, and wonder that made them popular in the first place. Not only must the show go on, but it must go on right!

The War Against Dirt

The projectionist's work, therefore, is never completed, but continues as a never-ending process. In this and a subsequent article we shall attempt to review the salient features of this process and briefly pause at those points which are in danger of being neglected. Suppose we begin with what may seem to be the most elementary of topics, the matter of preliminary equipment inspection.

A motion-picture projector has to be spotlessly clean and properly lubricated to work at peak efficiency. Lubrication is a simple routine matter, the only pitfalls being overoiling, on the one hand, and neglect, on the other. But what about the constant warfare against dirt?

The dirt that gums up a projector comes from the film, from the carbonarc lamp, and from the air. Film not only picks up grime, which it carries into the mechanism, but it actually creates dirt! Particles of emulsion and wax collect upon gate runners, tension pads, sprockets, and idlers, and chips of film collect in the fire-roller boxes and in the mechanism, itself. Routine inspection and cleaning of the film path is accordingly of the utmost importance.

We have warned many times against using screwdrivers and other steel objects for scraping deposits of hardened emulsion from the gate film runners. The best tool for this purpose is a "chisel" made out of heavy copper wire. Copper is considerably softer than steel, and hence won't scratch steel film-contacting parts.

The film-contacting surfaces of the gate runners and tension pads may be "dressed" with a trace of vaseline.

Sprockets are best cleaned with a

stiff-bristled toothbrush dipped in kerosene. (See this month's *Projection Clinic*.) The toothbrush may also be used to brush out film dirt from idler rollers.

Routine cleaning of the magazine fire rollers is accomplished by passing a cloth back and forth between them; and many projectionists use a strip of film cut along the sprocket holes to lift out the dirt that accumulates at the ends of the rollers and impedes their rotation.

The fire rollers require inspection for "flats" and rough spots which inflict "rain" and those deep, side-swaying scratches upon film, and they must be laterally aligned with the upper magazine and the upper feed sprocket to prevent damage to the edges of the film. Misalignment of the fire-roller assembly or of the upper magazine may be suspected if film chips or sheared-off film margins accumulate in the fire-valve boxes.

To test magazine and fire-valve alignment, wind about 25 feet of film on a 2000-ft. reel known to be in good condition. Place this in the upper magazine and thread the film down through the fire rollers and on the upper sprocket. Turn the projector over by hand and observe whether the film consistenly scapes upon one side of the reel. If it does, set the magazine over in the required direction.

Cleaning Fire Rollers

Free turning of the fire rollers requires cleanliness of the bearings more than oil. A droplet of oil applied with a toothpick is all that these bearings need, and this only at long intervals. If the 3-roller type of fire valve is used, make sure that the large roller is free to drop against the two fixed rollers, or gainst the film when the projector is in use. Cleanliness is as important in this type of fire valve as in the 4-roller type which sometimes causes film breaks when tightly packed wads of film dirt jam the rollers.

The alignment and condition of the lower-magazine fire rollers are equally important, but the presence of film chips in this valve may indicate a sprocket idler which is laterally out of line far enough to shear the edges of the film.

With the exception of a takeup belt which suddenly breaks—an unpleasant event which is prevented by using

As If We Needed It

This one's too obvious to let go by. "Smell" is a dirty word as far as the motion-picture industry is concerned, but there's a chance that actual "smellers" will be coming along. A Swiss, Hans Laube, has come up with Scentovision, a mechanism that synchronizes appropriate odors with a motion picture. You know: perfume for harem scenes, and for horse operas . . .

According to the inventor, Scentovision picks up signals from the film and releases the smell for the situation. Mr. Laube is described as an expert in osmology, the science of odors. We know a few others in this racket.

strong, securely stapled takeup belts—impending trouble in the lower magazine is usually indicated by failure of the film to wind up evenly and with a reasonable degree of tightness. This is a "prodromal sympton" which should never be ignored.

Aside from improper adjustment of the takeup tension, irregular takeup action is ordinarily caused by oil and dirt in the friction-disk unit and by a takeup belt which is too loose, thereby slipping on the pulleys. The belt should be tight enough to prevent slippage.

Old-Style Takeup Units

Modern takeup devices are a definite improvement over old-style units, but the latter still outnumber those of more recent design. With the exception of the ERPI universal base and a few other takeup units driven *via* chains, these employ the familiar old leather sewing-machine belt. Leather is mighty tough, but liable to stretch, and it is weakened by oil, atmospheric oxidation, and long periods of use. It is thus always a good idea to inspect the takeup belts every few months for signs of deterioration.

The strength of the coupling and the tightness of the belt are the most important factors anent takeup belts in otherwise good physical condition. Only one coupling staple should be present in a belt, hence several short lengths of belting ought never be spliced together to make a takeup belt. New belts may need retightening at intervals. Oil accidentally spilled upon a belt may be at least partially removed with a cloth liberally moistened with carbon tetrachloride or Carbona, a patent solvent which contains carbon tet and gasoline.

Takeup clutch assemblies of the

older Simplex type do not work too well when the leather disk becomes excessively oily. When takeup seems to be irregular, take the clutch assembly apart, clean the metal clutch faces, and soak the oil out of the leather disk with carbon tet. Only the takeup shaft should be oiled when the unit is reassembled — never the friction clutch. Adjust the tension so that a fully loaded 2000-ft. reel begins to turn by itself when the projector motor is switched on, but easily held back from turning by the touch of a finger.

Arc Lamp Cleaning Procedure

Cleanliness of the arc lamps is essential to consistently good light on the screen. A lamp with grime-encrusted feed and control components cannot give a steady light. Many modern lamps, especially the high-powered rotating-positive models built by such American manufacturers as Strong and Ashcraft, are designed to simplify the cleaning chore. Certain older arc lamps are veritable dirt-catchers, but be cleaned they must—and the projectionist is the fellow who has to do it!

The mirror and/or condensing lenses obviously require frequent and careful cleaning. The white dust from HI positive-carbon cores contains basic oxides that etch glass surfaces. This process is accelerated by heat, hence the advisability of keeping the mirrors clean during actual projection. Be sure to wipe the mirrors clean after the last evening performance.

Manufacturers' instructions anent the lubrication of arc lamps should be followed to the letter. Some lamp makers advise the use of graphite lubricants, others warn vigorously against them. Each manufacturer knows better than anyone what is best for lubricating his own make of arc lamps, and he is always glad to furnish this information to any projectionist asking for it.

The projector lenses are a vital link in the transference of pictures from film to screen. They require an increased allotment of the projectionist's time in these days of CinemaScope and cropped apertures.

Antireflection Coating

Projector lenses of modern construction are "bloomed" with a film of antireflection magnesium fluoride only 1/8000 mm in thickness to provide more light and better contrasts

on the screen. The blue-reflecting coating is as hard, or even harder, than glass, but on account of its extreme thinness it must be cleaned with a delicate touch.

Remove dust from lens surfaces by blowing or brushing, whenever possible, reserving the use of moisture and cotton cloth (or lens tissue) for stubborn spots of oil, grease, or stains lest by fingers which have accidentally touched the lens surfaces.

As a rule, the lens surface facing the film aperture gets soiled rather quickly because the heat of the arc beam volatilizes the oil on old prints to produce a mist of oil. Image quality deteriorates rather seriously when this oil fog condenses upon the lens. Use a mild soap solution followed by pure water, and avoid the use of organic solvents (acetone, alcohol, etc.) which often contain waxy impurities, tarry denaturants, and even compounds dissolved from bottle caps.

Anamorphic attachments require the same care as your fine projection lenses. They should never be taken apart, and, in addition, never readjusted for focus without the use of a test film having the highest possible photographic resolution.

Each matched pair of projection lenses is best stored in a clean velvetlined box together with the required aperture plates.

Required Sets of Lenses

Most theatres today have three sets of lenses and apertures on hand in the projection room: short-focus lenses and undersized apertures for nonanamorphic widescreen projection, long-focus lenses, anamorphic attachments, and large apertures for Cinema-Scope, and the old regular lenses with standard 0.825-inch x 0.600-inch apertures. Standard projection is unfortunately not much used nowadays in spite of the better light and focus it makes possible. Moreover, the conventional 1.375/1 aspect ratio provides a more versatile frame for cinematographic techniques, and is easier on the eyes because it corresponds exactly to the shape of the natural field of direct vision. (See the accompanying diagram.)

Don't forget that clean port-hole glasses are every bit as important as clean lenses! And if a steep projection angle prevails in your theatre, read the item on projector ports in this month's *Projection Clinic!*

The sound reproducers and associated equipment do not normally need checkups as frequently as the lamps and projector mechanisms. Then too, many theatres have RCA or Altec sound service to insure perfect functioning of the sound system at all times. The busy projectionist, thus freed from the highly specialized task of checking amplifiers and making the finer adjustments in soundheads, may then concentrate upon the mechanical components of the sound reproducers, and readjust optical-tube focus or replace magnetic pickup clusters only in cases of real emergency.

Care of Soundheads

The big difference in the maintenance of optical and magnetic soundheads is a clearly defined one. Mechanical wear is not a factor in the output quality of optical reproducers, but magnetic heads, like phonograph needles, progressively deteriorate with use. Optical heads need no replacement parts aside from exciters, photocells, and sprockets, and these at infrequent intervals, while magnetic reproducers require new pickup clusters (or pole caps in certain models) every year or two. Bad sound from magnetic heads cannot be corrected without the installation of new clusters, but all an optical reproducer needs for top-quality performance is readjustment of the optical tube or, infrequently, a new sound sprocket.

The pickup cluster of a magnetic reproducer requires correct lateral and axial alignment. If not lined up axially one edge of the film may contact the pole piece with less pressure than the other edge; and this may cause weak or distorted sound in one or two of the three stereophonic channels. A weak left or right channel has the effect of shifting the sound to one side of the screen, a common and disturbing effect in many theatres having CinemaScope stereophonic sound.

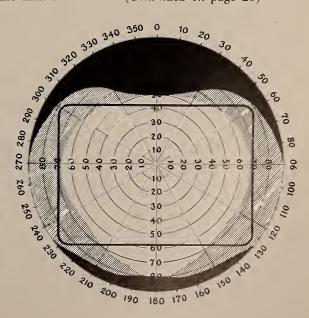
Demagnetizing Projector Components

CinemaScope magnetic sound requires demagnetization of the entire projector film path. An AC electromagnet enables the projectionist to "degauss" steel sprockets, idlers, film runners, tension shoes, fire rollers, etc. Once a projector has been thoroughly demagnetized, it is not necessary to repeat the process until such time as screwdrivers and other steel tools are used for working on the film side of the projector. Screwdrivers which have been used in the vicinity of arc lamps, motors, generators, rectifiers, transformers, amplifiers, etc. usually have more or less magnetism which is readily transferred to projector parts. Contact of magnetic tracks with magnetized objects may result in partial erasure of the sound record and the introduction of troublesome clicking, thumping, humming, or whirring noises.

A preliminary optical line-up of the projection equipment includes adjustment of both arc lamps for optimum output and lamp- or mirror-distance corrections, when necessary, to minimize hot-spot effects. Unless adequate screen illumination is a problem, the lamps should be adjusted for a light distribution more uniform than that

(Continued on page 20)

Perimeter chart showing the angular extent of the binocular visual field (clear area) when the eyes are fixed upon a median point in the horizontal plane. Superimposed over this field of direct vision is a rectangle corresponding to the standard soundfilm projector aperture of 1.375/1 aspect ratio. This shape of screen is obviously better suited for continuous viewing, and hence less tiring to the eyes, than the "mailslot" screens of excessive aspect ratio.



L ITERATURE in the field of projection practice is prolific on the subject of optical alignment of the light source and projector. The question is often asked however: "Just what is the best method of aligning the lamp?"

The answer must be a qualified one. Some lamp manufacturers have pointed out that good alignment may be secured with nothing more than a piece of string. While this method may not be the ultimate in accuracy, there is no denying that many projection rooms have used the system for years with passable results.

The writer leans to endorsement of the alignment tools made by a popular manufacturer utilizing two rods which meet at a point between the aperture and the positive carbon crater position. At the point of juncture, two discs with machined faces permit most accurate comparison of the planes of the axis of the lamp and the projector lens.

The tool just described has the advantages of extreme accuracy and adaptability to several different types of lamp and projector. But whatever the method which may be used, it should be beyond debate that it is necessary to obtain as accurate optical alignment as possible if the best luminous efficiency of the system is to be obtained.

Mirror-to-Crater Distance

Let it be granted, then, that the projectionist has adjusted the lamps for proper operation by aligning the center line of the positive carbon with the center line of the projector lens. The remaining problem is that of setting the mirror-to-crater distance. This statement assumes that the setting of mirror-to-aperture working distance

The best method of optical alignment of the light source and projector is a matter of some qualified discussion.

Proper Method Of Arc Lamp Alignment

By JOSEPH HOLT
Member, IA Local 428, Stockton, Calif.

has been ascertained either by direct measurement, or preferably by sliding the lamp as an integral unit along the optical axis until the desired side-tocenter ratio is obtained on the screen.

Some manufacturers suggest that the mirror-to-carbon distance be adjusted by visual observation of the light on the screen. Two factors argue against this method. First, exact balancing of the color and quantity of light between lamps is doubtful even when compared directly on the screen by using split apertures. Second, careful adjustment is prevented due to the short exposure times available for full-light transmission through the projection lens.

A much better method makes use of the pinhole aperture, and allows leisurely adjustment of the working distances for the lamp. It is surprising in view of the efficiency and accuracy of the pinhole method that it has been relatively little used.

Most theatre supply houses have in stock or can supply with very little delay what is usually described as "blank aperture with pinhole." If made from a blank which has been properly cut for the projector in use, such a device is durable and valuable.

The diameter of the pinhole is not sharply critical; the larger the hole, the greater the light passed with no particular advantage to the user. The smaller the hole, the sharper will be the image obtained as sketched in the illustration.

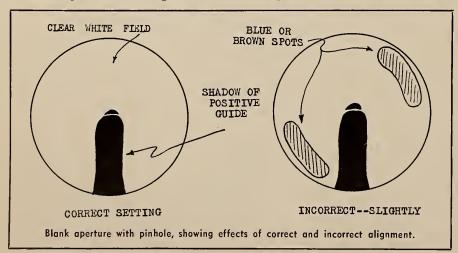
Those who have not used the pinhole aperture will be pleased at the advantages afforded by its use. One, it shows immediate difference in the slightest change in adjustment of the lamp and is thus useful in setting each lamp in the room at precisely the same color light output. Two, it is easy to set a lamp between reels and during the performance if necessary, since the image as sketched is obtained by placing a suitable sheet of paper at a distance of a foot or so in front of the projection lens. A most convenient method is to stick the paper in the appropriate place on the port shutter, which when lowered will position the paper in such manner as to show the image obtained through the pinhole.

Proper Alignment Image

The display obtained with the pinhole aperture is a function of the focus of the mirror in the lamp, the focal length of the projection lens, and the distance to the paper screen. When the lamp is properly set in all respects, a uniform white circle will be observed. Any maladjustment will be indicated by small areas of blue or brown in the circle of white. Serious error in setting will present concentric circles of brown or blue surrounding the white circle. The center shadow will be the silhouette representation of the positive carbon, its clamping jaw and guide, as well as the tip of the negative carbon.

The visual accuracy of the pinhole has interesting results. It is not uncommon to be able to spot the reflector manufacturer's mark on the face of the mirror, and in days past when mirror imperfections were frequently encountered, such blips would show up quite readily as discolored dots in the paper screen display.

The heat of the arc is blocked off (Continued on page 26)



From the British Viewpoint:

On Print Problems

The British Kinematograph Society has "further ventilated" the print problem, and we think that certain shortcomings delineated will be familiar to projectionists on this side.

By R. HOWARD CRICKS

S OME MONTHS ago I discussed the view widely held here, that prints of many American films shown in this country are of inferior quality. At two recent meetings of the British Kinematograph Society the matter has been further ventilated, and it is a problem which American producers should seriously consider.

At the first of these meetings, my old friend Bert Ellis, print manager of Associated British-Pathe, told us that while most prints of British films are struck from the original negative, overseas producers generally send over a fine-grain print only. F. E. Juett of George Humphries, Ltd., one of our leading laboratories, said that as a result of complaints over many years he is now receiving satisfactory facilities. But it seems to be a fact that, because of the peculiar customs regulations which I previously mentioned, the lab always has to work from a married print.

Now a married print can be quite acceptable as a master if it is struck from the original negatives (both picture and sound) and specially processed. But a married print made from dupe negatives and processed as a release print is quite unsatisfactory.

The extra cost in duty of sending over separate picture and sound negatives, as compared with a single positive, would be somewhere about \$1000. Isn't it worth that expenditure to ensure perfect prints, not only for this country but for the whole of the European release, which is generally printed here?

Dark Prints

Another vexing problem discussed at the second of the above mentioned meetings was print density. I don't suppose the general run of American motion picture theatres are much better than our own shows in regard to consistency of screen brightness; our circuit theatres are invariably well up in the range permitted by the British standard (which is practically the same as yours), but among the smaller independents screen brightnesses of a very low level are to be found

The studio and lab people rightly ask: how is it possible to provide prints that will satisfy on the one hand the small theatre equipped with modern arc lamps which are run full out and produce a blaze of illumination; and on the other hand the large but ill-equipped theatre where the brightness measures only a very few foot-lamberts?

A factor in this problem is the liking of the cameraman for low-key scenes. A number of projectionists condemned such camera work as "artycrafty" and demanded newsreel quality in their prints. But at last month's meeting one of our leading cameramen, Erwin Hillier, who photographed "Dam Busters," defended the low-key scene. This particular film contained many night sequences; he did not see why a film should be ruined because so many cinemas are badly equipped. The release print was, we learned, standardized only after lengthy tests in which Mr. Hillier co-operated with the laboratory and the print manager.

Films for TV

From the point of view of the artistic, creator Erwin Hillier is of course right. But I wonder whether a little more compromise is not possible, in view of the fact that most exhibitors just can't afford to re-equip to bring their theatres up to standard.

An aspect of this question which is becoming of increasing importance is the effect of such prints when transmitted on television. I used to think that an essential feature of any television receiver was DC restoration, which by locking the black level to the base of the sync pulses (or in your case I suppose to the peak of the pulses), assures that brightness of the picture on the screen shall be correctly related to the transmitted signals. But most sets today are made without this refinement, with the result that a night scene, instead of appearing black, is just grey, with poor definition.

Picture steadiness in TV films has also been receiving attention. Any sign of picture jump will immediately brand a programme as having been filmed; picture jump is much more noticeable on the TV screen than on the cinema screen, because of the unpleasant effect produced by interaction of the TV raster, picture jump, and lines which are nearly horizontal.

This defect is especially difficult to avoid with the 16-mm film. Pat Vinten (whose father founded the well-known camera firm where I spent the first years of my business career) recently discussed problems of picture registration on 16-mm, and left us wondering how a reasonably steady picture could ever be produced from the narrow-gauge film.

Chiefly for this reason, 16-mm is rarely used for either of our TV services. But knowing how widely it is used in the States, I have wondered how you overcome this trouble.

Picture Definition

Yet another subject discussed by the BKS was picture sharpness. Prints, it was generally agreed, are improving in this respect, but, quite apart from the projectionist who has not learned the delicate art of focusing, there are many factors giving rise to lack of focus on the screen.

We were interested to learn from Nick Mole, one of whose jobs is handling technical complaints from the public for one of our two major circuits, Associated British Cinemas, that most such complaints relate to poor focus. Very seldom are complaints made of poor screen illumination or sound.

Undoubtedly an important factor is the use of old lenses which are not capable of the results expected today, particularly in regard to the coverage of the large CinemaScope frame. Misting of the glasses was stated to be due to the lens "breathing" in the greater heat caused by a more powerful are and color films, and so sucking in dirt and dust from the atmosphere. Len Rider, of Twentieth Century-Fox, mentioned that he had noticed an image of the mirror frame and front positive jaw imprinted in the bloom, he believed caused by an electrostatic effect.

Mechanical faults such as the gate not being perpendicular with the optical axis, and gate skates not flat, are also causes of uneven focus. On the other hand, he was of the opinion that the curved screen might even improve focus, because the lens rarely has a perfectly flat field.

Mass-Producing Optical Glass

In Hollywood's studios, many of the camera lenses are, we are told, made by the English firm of Taylor, Taylor & Hobson, Ltd. Their quality owes much to the high grades of glass used in their manufacture, most of which is made by the old-established firm of Chance Bros., who a century ago supplied glass to the German lens makers.

Until recently optical glass was made in the traditional manner: the ingredients were melted in a clay pot, and after cooling and annealing the pot was broken up, and suitable chunks of glass were selected for re-melting, moulding, grinding and polishing.

But glass blanks for lenses are now being made by mass production. At St. Asaph, in North Wales—the uppermost of the three prongs that on the map stick out to the left-hand side of England—the firm of Chance-Pilkington has built a 2½-million-dollar ultramodern factory in which the ingredients are put in at one end of the machine, and the finished mouldings come out at the other. The output of the factory will shortly be 60 million blanks a year.

The new plant operates under license from the Corning Glass Works and under the agreement we were not permitted to see all of it. But we saw enough to realize the brilliant way in which the many problems have been overcome.

First, the special sand is mixed in a roller mill with various chemicals, according to the type of glass needed. The "frit," as it is now called, is transported to the furnaces, where it is melted into glass. Obviously a major factor in the success of the process is the exceedingly close control of this operation. Although we were not permitted to see the furnaces, we saw the control rooms where were dozens of meters recording and maintaining the temperature at various points. The temperatures indicated ranged from 1210°C to 1570°C.

From the furnaces the molten glass

passes down a chute to the moulding machine. This consists of a number of gas-heated moulds on a rotating table; as the mould moves underneath the chute, shears cut off a "gob" of glass, which drops into the mould, where it is pressed into shape and allowed to cool. To ensure the gob being of correct weight, a control of temperature to within 2°C is necessary.

When the moulding has cooled slightly, it is picked up by a vacuum suction, and dropped on to a belt which carries it into a lehr, or continuous annealing oven. From the other end emerge the glass mouldings ready for despatch to opticians throughout the world, for making into lenses of all sorts.

Projectionist License Exam Questions

THIS DEPARTMENT has been running for some time now, and surprisingly, we haven't run out of questions. Which only goes to prove that the projectionist's job is not exactly uncomplicated. On the official exam, 75 per cent is passing. You should do better, and to make sure you will find correct (we hope) answers on page 19.

- 1. The AWG (American Wire gauge) wire table gives copper wire sizes in:
 - (a) square mils; (b) square inches;
 - (c) circular millimeters; (d) circular mils; (e) circular inches.
- 2. Copper wire is measured by the:
 - (a) diameter over insulation;(b) cross-sectional area of the insulation;(c) cross-sectional area of the copper;
 - (d) type of braid on the wire; (e) type of insulation used.
- 3. An economizer is a:
- (a) variable rheostat; (b) step down transformer; (c) circuit protector; (d) convenient means for reducing light; (e) a discount on electrical equipment.
- 4. Designate by letter the piece of electrical apparatus that doesn't belong with the group:
 - (a) generator; (b) transformer; (c)
 - (c) copper oxide discs; (d) transverter; (e) tungar bulb.
- 5. An Edison 3-wire system provides:
- (a) fluorescent lighting; (b) a raw DC source of power; (c) a raw AC source of power; (d) auxiliary current for the amplifier; (e) a special line for operating AC motors.
- 6. A transformer that raises the voltage above the level of the input voltage is a:
 - (a) step-by-step transformer; (b) step-out transformer; (c) step-down

transformer; (d) step-off transformer; (e) step-up transformer.

- 7. An optical train consists of:
 - (a) arc and aperture; (b) projected light and screen; (c) a series of lenses; (d) a ground glass mirror; (e) a metallic mirror.
- 8. When a ray of light strikes a polished surface obliquely, the angle of the reflected ray is equal to the:
- (a) angle of refraction; (b) refractive index of the surface; (c) critical angle; (d) angular motion; (e) angle of incidence.
- 9. Refraction of a light beam occurs when a ray of light:
 - (a) strikes a reflecting surface at an angle (b) is interrupted by a sound wave; (c) is absorbed by a translucent medium; (d) passes at an angle from one medium to a medium of different density; (e) strikes a metal surface.
- 10. Glass mirror reflectors in lamp houses are capable of intercepting light beams over an area of:
 - (a) 70° ; (b) 90° ; (c) 100° ; (d) 120° ; (e) 180° .
- 11. The image formed by motion picture projection is:
 - (a) a virtual image; (b) an imaginary image; (c) a real image; (d) a demagnified image (e) a reproduction of an image formed at the condenser lens.
- 12. Lens are effectively cleaned with:
 - (a) soft cloth, grain alcohol and water; (b) soft cloth, denatured alcohol and water; (c) hard cloth, grain alcohol and water; (d) hard cloth, denatured alcohol and water; (e) an acetone solution

8-mm film is now adaptable for TV programming, thanks to a simplified redesigning of a standard small projector.



Projection room of station KAKE-TV, Wichita, Kansas, shawing an orderly and economical set-up.

8-mm Modification for TV

F INTEREST to those projectionists who also make a hobby of their craft is the recent information in the National Press Photographer that a successful method has been devised to transmit 8-mm film to TV. Developed by Paul Threfall, director of photography for station KAKE-TV, Wichita, Kansas, the system requires a modification of an 8-mm projector so that it can be in sync with the sweep of the video.

Up to now, transmission of 8-mm motion pictures, both amateur and newsreel, has been less than satisfactory. The primary importance of the new development is that any film coverage, be it 35-, 16-, or 8-mm, is feasible for TV. 8-mm has been a standby for the home movie medium, but recent improvements in cameras and lenses which will insure better definition might make the small-measure medium a significant factor in TV news coverage. Transmitting to TV, the picture enlargement is negligible.

Development Background

To let Mr. Threfall speak for himself: "16-mm newsfilm will no doubt be standard for TV news for a long time to come. However, very often we have run into a situation where 8-mm film is the only footage available of a good news story. There are several methods used to adapt 8-mm to TV, but we feel we have come up

with a rather simple solution after a year of experimentation.

"We have 65 camera correspondents over Kansas and Oklahoma. Twenty of these have 16-mm silent cameras, two have sound cameras. From the rest we have been settling for still pictures of news events. We have made a survey of those furnishing us with stills, and found that another 15 had 8-mm cameras, but stories didn't happen often enough for them to shift to 16-mm cameras when the only reason for having an 8-mm was for their own movie use. This prompted us to see how we could utilize their 8-mm cameras for news coverage.

"Paul Elder, the station's projectionist, was approached with the problem. He said the answer would be to find an 8-mm projector that could be modified so it could be synchronized with the sweep of the video system. Elder studied several makes of projectors, and finally decided the Eastman Showtime 8 (Fig. 1) would be the simplest to adapt.

"It took him some months experimenting with various shutters and other changes to come up with the final result. As it turned out, it was quite simple.

"The tilt mechanism of the projector was removed. The drive motor clutch was also removed. However, the drive motor, which has a fan blade on one end of its shaft, was retained as lamp house blower. The rewind gear and still frame iris were both removed. The regular shutter was removed and replaced with a 4-blade shutter (4 openings) with each opening cut to exactly $4\frac{1}{2}$ degrees. (Fig. 2.)

"An external synchronous motor was mounted at the rear of the projector to drive it. This motor, which cost about \$60, is the same used in the Magnecord tape recorder. It has a speed of 900 rpm and can be locked on 60 cycles, 110-volts, but has to be phased each time it is turned on. (Fig. 3.)

Phasing Procedure

"Phasing is accomplished by attaching the motor in a rotating mount which enables it to be phased in about one second at the beginning of each film roll—actually before the switcher has cut the projector 'live' on the air.

"For a little more outlay of cash, it would be possible to install a sync motor having a permanent magnet rotor, or one with DC polarized fields, which



FIG. 1. Paul Elder, member of Wichita Local 414 and KAKE-TV prajectionist, wha modified the Eastman "Showtime 8" far use an multiplexer of film chain. This view shaws its relative pasitianing with other slide and 16-mm projection equipment.

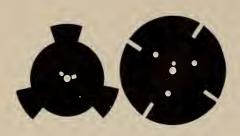


FIG. 2. Standard shutter (left) of the Showtime 8 compared with Elder's modification with openings of 4½ degrees.

has to be phased only when set up, and then remains in phase as long as the sync generator phasing is not changed. However, we have found our manual phasing set-up quite satisfactory and inexpensive.

"Our adaptation with the 900 rpm motor provides a 5 per cent application time, and the projector operates at a film speed of 15 frames per second. The original film, of course, is exposed at 16 frames per second, but the loss of 1 fps in projection is not noticeable on the air.

"The projector came with the standard 1-inch lens. This was replaced by a 16-mm 2-inch lens."

Note in Fig. 1 that the mounting plate for the external sync motor is also the base plate for the projector, bolted to a pedestal which in turn is bolted to the floor. The pedestal has adjusting leveling screws.

The alignment of the sync motor drive shaft to the projector drive shaft is very critical. The motor is mounted in such a way to give firm support, at the same time allow the necessary rotation so it can be phased to the sync generator. (Fig. 4.)

As it happens in newspaper work. it may be that the only photographic coverage of a story is from amateur sources. But 8-mm cameras, like most 16-mm operate at 16 frames per second.

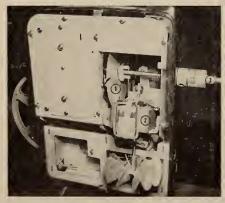


FIG. 3 Exterior view showing (1) shutter; (2) standard motor that is retained as lamphouse blower; (3) shutter control shaft to external motor shaft.

The fact that the film might be Kodachrome is negligible. Color film can be processed as negative black-and-white and, by reversing the polarity in the video system, it can be transmitted with positive results.

Double 8-mm Stock

"Our 8-mm camera correspondents are furnished film to have ready when needed," Threfall said. "We purchase the film in bulk (16-mm black-and-white, perforated for 8-mm) and spool the film ourselves. This is necessary since manufacturers are no longer furnishing 8-mm black-and-white film.

"Since our lab processing machine is designed for 16-mm film, there is no problem in handling the double 8-mm stock. After it is processed it is slit to the 8-mm width with inex-



FIG. 4. Control shaft to the external motor plate and control arm for phasing during beginning of the film roll.

pensive equipment, then edited and made ready for transmission on the converted Showtime 8 projector."

The KAKE-TV staff—Paul Elder, Ben Swart, Ed Storey, Bill Cope, Gary Hultgren, and Bill Henley—all Wichita IA Local 414 members, have also developed an opaque projector of their own design. It can be used on material 4 x 5 inches to 8 x 10 inches. The projector's present use is for certain news shows that are not on live camera.

"The idea of building an opaque projector came up after we read an article concerning one that some small station built which did not have a telop projector," said Elder. "We felt that they had a good idea, but could stand some improvements. We did our experimenting with a wood 3-legged easel, two work bench lights, and several lenses of various focal lengths. We



FIG. 5. The opaque projector showing its mounting on the multiplexer.

chose a standard 2 25/32-inch diameter 8-inch E.F. lens.

"The lens mount is a \(^3\)\setence inch thick plate with 2\(^1\)\chi_2-inch rods mounted lengthwise so the lens can be focused by sliding it either direction. Plans for the easel were a joint affair, and it was made at a metal shop. The easel will move in and out, and also has a screw adjustment for vertical positioning. The size of the material to be projected can be as small as 4 x 5 inches, and up to 8 x 10 inches. Two 300w RFL type lamps are used for lighting material on the easel."

In response to a request from the station manager, a standard IBM clock was mounted on the wall to show time, temperature, and humidity. With the design of the easel, the clock is picked up through the opening in the center of the easel. The area covered on the clock is 18 x 24 inches. Four RSP-2 photo-spot lamps are used for it. The news room adjoins the projection room, and temperatures and humidity figures are obtained from the weather bureau.

SMPTE Convenes in April

The next convention of the Society of Motion Picture and Television Engineers will take place April 21-25 at the Ambassador Hotel in Los Angeles. One of the expected highlights of the meeting will be a comprehensive exhibit of the latest industry equipment developments.

Herbert E. Farmer of the cinema department of the University of Southern California will be chairman of the convention program, and Bernard D. Plakun of General Precision Laboratory heads the papers committee. They expect this 83rd semi-annual conclave to be the biggest and best to date.

Projection CLINIC

Projector Ports and Picture Quality

ALL OF US are familiar with the effect of soiled glass in the projector ports—dim, "fuzzy" images marred by such contrast-degradation effects as dulled highlights, fogged grays, and washed-out blacks. But what of improperly

positioned port glasses?

Even plate glass of the highest optical quality will injure the clarity of the projected pictures if the light rays pass through the glass at substantial angles. Glass bends (refracts) light when angles are involved; and even when these angles are small, reflections taking place inside the glass result in a serious displacement of some of the light rays and make a sharp focus on the screen utterly impossible. And the shorter the focal length of the projection lens, the worse is the effect of internal reflections in the port glass! Figure 1 illustrates what happens to light rays passing through plate glass obliquely.

It is fortunate that the image-blurring internal reflections may be eliminated by positioning the glass perpendicularly to the optical axis of the projector. This fact may be demonstrated by holding a pane of plate glass in the projection beam and tilting it at various angles while a sharply focused picture is being projected.

We have found that blurring by the port glass is just perceptible at an angle of six degrees, and is quite serious at angles greater than 10 or 12 degrees. For this reason, therefore, the projector-port glasses should not be set flush with the projection-room wall in theatres having projection angles greater than five degrees. In all such theatres, the bottom of the projector-port glasses should be

brought out from the wall so that the glass tilts upward at an angle equal to the projection angle, as shown in Fig. 2 where an angle of 15 degrees is assumed for illustrative purposes.

This done, the projected light rays will impinge upon the glasses squarely and pass through them undeviated by refraction or internal reflections. The trouble of constructing special tilted holders for the port glasses is well worth while as regards improved picture quality. And, of course, only colorless optical plate glass of the highest quality should be used in projector ports.

Damaged Reels Endanger

PROJECTIONISTS are reluctant to use "shipping reels" in the projectors, and rightly so. They are frequently bent and battered, and hardly fit even for shipping film to and from the exchanges. The 1,000-foot shipping reels are especially bad because the hub is so small (134-inch diameter). Film will

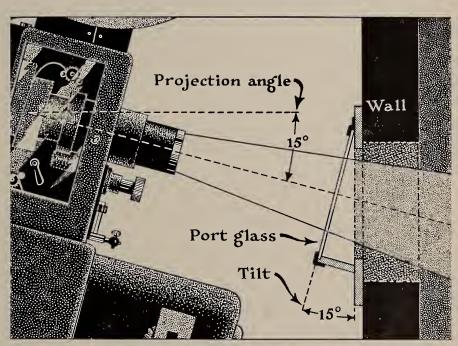


FIG. 2. In order to avoid the image-blurring caused by internal reflections, the optical axis of the projector should pass through the port glass squarely. In theatres where a substantial projection angle prevails, therefore, the port glass should be tilted out from the bottom at an equal angle to minimize adverse optical effects. The projected pictures will then have maximum clarity.

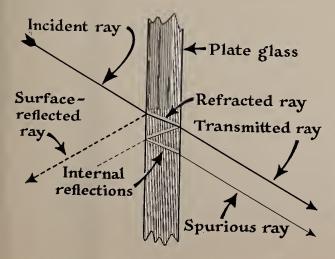


FIG. 1. Rays of light passing through plate glass at an angle are refracted (bent) and internally reflected. The reflections from inside surfaces produce unavoidable blurring of the picture when image-forming rays from a projector pass through the port-hole glass obliquely.

not "take up" on them when used in the lower magazines of many projectors.

The set of film reels owned by the theatre should naturally be of the very best quality and kept in good condition to prevent damage to the prints. "Projection reels" are usually made of cast aluminum or welded iron wire, although 2,000-foot spring-steel reels similar to those used by the exchanges are preferred by some. All of these reels (or "spools," as they are called abroad) have disadvantages which must be carefully considered.

Cast aluminum reels are brittle, and may crack if roughly handled. Weldedwire reels bend out of shape rather eas-

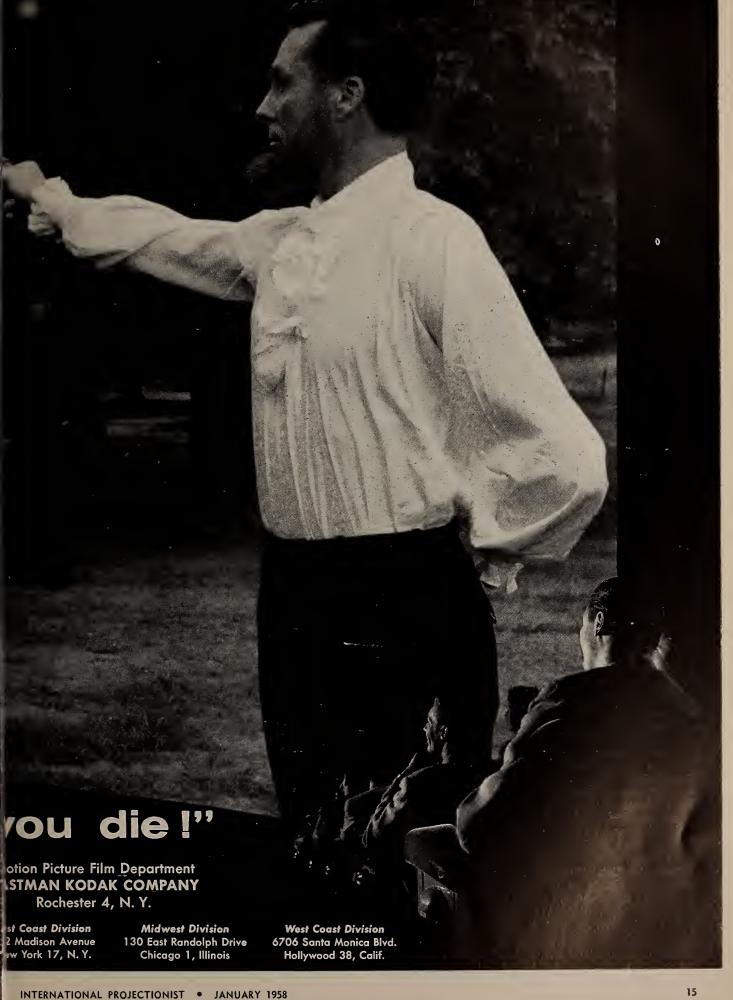
(Continued on page 20)



"On mine honor, sir-

A dramatic situation! Yes...but, it's not just the plot that holds the audience captive. It's a startling sense of "reality" due, in great part, to new bigness of screen and scope—new technics of production, processing,

and projection. Whatever your project -or problem-Kodak stands ready to lend a hand through the Eastman Technical Service for Motion Picture Film. Offices at strategic centers. Inquiries invited.







The function of this department is to provide a forum for the exchange of news and views relative to individual and group activities by members of the organized projectionist craft and its affiliates. Contributions relative to technical and social phases of craft activity are invited.

In The SPOTLIGHT

THE recent California District Council No. 2 meeting held in Hollywood, Calif., was highlighted by reports pertaining to the activities of its Local members. The delegates met at the "Bit of Sweden" restaurant and were welcomed by Leo Moore, business representative of host Local 165, Studio Projectionists.

Reporting for Los Angelcs Local 150, George Schaffer, business representative, spoke of the difficulty he encountered in trying to effect a settlement with the Fox West Coast Theatres. He expressed confidence that matters would be brought to a satisfactory close with the expected arrival on the West Coast of IA President Richard Walsh.

Trouble seems to be brewing in Palm Springs. Frank Smith, president of Hemet Local 707, reported that members of the Musicians Union and the Actors Guild were working in non-union establishments at the resort. The Council went on record as condemning these tactics and a resolution to this effect was voted to be sent to James Petrillo, head of the Musicians Union.

Contract negotiations between San Bernardino Local 577 and the Fox West Coast circuit were progressing satisfactorily, according to Harry Reynolds, business representative. Reynolds presented a proposed retirement plan, approved and adopted by the Council, with a request that IA President Walsh adopt it as a standard national policy. He also suggested a standard contract provision allowing for three weeks vacation with pay for projectionists after ten years employment.

San Diego Local 297 reported signing new contracts including provisions for a health and welfare plan. Locals 656, El Centro, and 761, Chula Vista also reported satisfactory progress in contract negotiations.

The popular Miss Florence "Rosie" Rose, private secretary for host Local

165, assisted the officers in welcoming the delegates and guests. (Miss Rose was private secretary to President Walsh for many years prior to migrating to the West Coast and enjoys great popularity in projectionist circles.)

The Council meeting scheduled for next month (February) will be held in Chula Vista, with Local 761 acting as host.

- IA President Richard F. Walsh was re-elected vice-president of the AFL-CIO and member of the executive council. Twenty-five vice-presidents, including Walsh, were re-elected at the AFL-CIO second constitutional convention held in Atlantic City, N. J., the latter part of December.
- The many friends of Charles Rothholz, member of Local 244, Newark, N.J., will be glad to learn that he has

returned to work after lengthy hospitalization at the Veterans' Hospital. Rothholz underwent a leg amputation about a year ago and although he tried once before to get back on the job the medicos would not okay his discharge from the hospital until last month. He would like to hear from some of his old friends in the Alliance and may be reached at 52 North Munn Avenue, Newark, N. J.

- Louis Barr, business representative for Winnipeg Local 299, was elected delegate to the Union Trades Label Department convention slated for April.
- The National Labor Relations Board of Washington. D. C., decided in favor of IA Local 409, Matco County and Palo Alto, Calif., in a complaint charging the union with influencing the Columbia Broadcasting Studio to "discriminate against the charging party" by refusing to assign him to work as a stagehand for CBS. The complaint was dismissed after a hearing before the board.
- After spending considerable time and effort in studying various pension plans Local 299, Winnipeg, Man., Canada, finally accepted a plan submitted by the Manufacturers' Life Insurance Company of Canada, as the one most feasible for its membership. The plan has been approved by the Canadian government and is being considered for acceptance by other IA Locals in both Districts 11 and 12.

An interesting feature of this plan is that it is wholly operated by the Local, with management only contributing its share of the required percentage of employe salary. Each member of the Local contributes 5% of his salary to the

Veteran NYC Projectionist Appointed to Court Post



Morris J. Rotker, retiring member of New York Local 306, was recently appointed confidential secretary to the Honorable James W. Donoghue, justice of the Municipal Court, Second District, Bronx, N. Y. Long active in civic affairs and the holder of office in many community organizations, Rotker's latest appointment came as no surprise to his many friends throughout the country. He has been cited for his outstanding work in federal, state, and municipal branches of government and is the recipient of numerous placques, certificates, etc., for his achievements. He is also chairman of the

local school board in his community, a post he has held for a number of years. As one of the founders of the 25-30 Club of N.Y.C., Inc., Rotker is known throughout the Alliance as an untiring worker for the betterment of craft welfare. He spearheaded the copper drippings drive for the Will Rogers Memorial Hospital. A projectionist for more than 50 years, he served Local 306 in almost every official capacity. For the past 15 years he worked as projectionist at the RKO Marble Hill Theatre in the Bronx, N.Y. Rotker's retirement from the Local takes effect the end of this month and instead of sitting back and enjoying a well-earned leisure, he is looking forward to a new career in the municipal government of the city.

THE OLE CRANK TWISTER

...on Button Jabbers

AD THE BIGGEST turnout in the history of our Local Union last meetin. Every member present (for once't) and, in addition, a big delegation of visitin Brothers from the near-by Sister Locals, as far away as forty miles. The Union Hall was so packed that the boys had to drag in a whole flock of extra chairs, and fill up the aisles with them, in order to avoid violating the no standing fire laws.

It just seemed that everybody was in on the reason for the gala event except "yours truly". Imagine the surprise and embarassment when it turns out that the special attraction was to confer honors on the Ole Twister for his long endeavors in misleadin the young from the pitfalls of inexperience. For a feller not given to braggin by tootin his own horn, and allus bein shy of the spotlight, the occasion was just like a 140-foot drive-in theatre screen—simply overwhelmin!

"Flicker" Blankscrean, our Chairman, made a elegant speech, full of flattery about the untiring devotion, faithful service, and great accomplishments of "you know who"; at the end of which he called for a standing ovation. It seemed that Flicker hadn't made hisself quite clear on just whom the ovation was intended for, so the opposition boys refused to rise because it looked to them like maybe Flicker was either referrin to his own self, or at least includin hisself in the ovation.

After a lively exchange of harsh words, the difficulty was cleared up to the complete satisfaction of the opposition, and the entire assembly rose to a man with such loud cheerin that your correspondent, in a touching demonstration of humility, shut off his hearin aid. It is regrettable that while the hearin aid was shut off the Chairman had found it necessary to admonish a certain member

for cheerin like he was jeerin. Yep, the envious an the spiteful—always present like poor business at a drivein theatre when its snowin outdoors.

The toomultuous ovation finally subsided and this unassumin benefactor of youth and inexperience was directed to wheel his chair up to the rostrum, there and then, to receive the engraved crank handle of a Nick Powers Model 6B, emblematic of membership in that illustrious circle—The O.O.T.G.S.&C.

Flicker then declared to the assembly, "In token of our esteem, we confer upon Ole Twister The Order of the Geneva Star & Cam, together with the rank of Primordial Projectionist. We are proud of our renowned Brother member; grateful for the fame our learned collegaue has attached to our Local—a superb showman; and hardly never the showoff. In the future, it will be your privilege to add the exclusive double P follerin your name, just like them scientific college graduates puts B.S. behind theirs."

"Button Jabbers"

But before some cynical reader gets the false idear that Ole Twister is engagin in double talk by proclamin maidenly modesty while at the same time praisin his own self, let us proceed to the topic which was his intention to talk about in the first place, namely: "Button Jabbers."

Button Jabbers is nincompoops who jab the X-L fader button instead of p-r-e-s-s-i-n-g and momentarily holding it. Unhappy results usually follow this fault in the form of relay failure and no sound; or—with both lights on, which in turn results in volume as weak as the burial scene in "Giant," and accompanied by muffled clunks from the run out projector.

Judging from the way the innards of a fader box is shunned, you'd think a rattlesnake was in residence. Open the cover and let's get acquainted. The audio changeover mechanism is simple, and comprises a multicontact gauged double-throw spring blade switch, a relay, and a plunger plug.

When the plunger is pressed, the springy fingers are pushed over into contact, and the nib of the relay keeper locks the spring fingers in contact. Notice particularly that a small time period is required for the nib to fall into the lock positionthe reason for relay failure when the button is jabbed. The plunger-actuated relay is therefore locked mechanically, while simultaneously the relay on the opposite machine is unlocked electrically. The doublethrow switch action, transferring the intermediate amplifier to the proper volume control and its respective P.E.C. amplifier, seems well understood and requires no comment.

It is almost unheard of for a changeover relay to konk out completely. However, in the event of the improbable, operation may continue on an emergency basis without the benefit of relays. Set both relays in lock position by hand—(Caution! Live circuits unless the switch is pulled). Audio changeover is then made with the volume controls—up on one machine and down on the other. The fader is necessarily raised above the normal setting on the live machine to offset mismatch in the output.

Fader care and service is quite simple. The individual contacts on the spring finger switches, usually silver or palladium, are self-cleaning due to impact. The magnetic fader however is frequently idle for long periods of time, subjecting its contacts to corrosion by inactivity. A vigorous working-over which requires two men is the answer. You push one button, and he pushes the other. back and forth. This treatment will usually clear corroded contacts without recourse to sanding. One drop of oil in the plunger bushing is sufficient lubrication for a long time.

> Frank Macdonald, Local 199, Detroit, Mich.

pension fund, with a like percentage from his employer. All contributions—from members and exhibitors—are made direct to the Local, which then turns them over to the company underwriting the plan, the Manufacturers Life Insurance Company. The insurance company keeps a record of the payments and ab-

sorbs all administration costs.

- A new contract ended the dispute between Local 330, Ft. Worth, Texas and the management of the Poly Theatre there. IA men are once again back in the projection room.
- Seventeen men, the majority of them

sons of members, were admitted to membership in Local 199, Detroit, Mich. The new members were introduced at a special midnight meeting last month held at the Detroit Labor Temple. It was a gala occasion and most of the Local members were in attendance. Dwight Erskine, president, was toastmaster.

Although the transistor and other semiconductors have challenged the supremacy of the vacuum tube as heart of the electronics circuit, the tube is still here and probably is here to stay at least in some form. What started out as an imperfection

in the electric light bulb now has an importance that is staggering to contemplate; what was once a simple lamp has grown into a conglomeration of complexities and some odd deviations but nevertheless all components depend on its principles.

What Is ELECTRONICS?

By JOHN SEARS

II. Vacuum Tube Development

LECTRONICS, and more specifically the motion-picture industry, owes much to Thomas Alva Edison—but it doesn't owe him that much. He did not (as the TV quiz programs would have you believe) "invent" motion pictures. He was, in a sense, a Johnny-Come-Lately by a couple of centuries. But the entire world of electronics owes the Wizard of Menlo Park a debt because of a "bug" in his electric light bulb.

In 1883, that genius undertook the problem of trying to find out why his lamps would blacken after a certain amount of time. Experimenting, he found that some sort of cloud of infinitesmal particles came off the hot filament and settled on the interior of the glass bulb. Since the cloud came from a hot filament, Edison added another cold plate inside the glass bulb. When this plate was

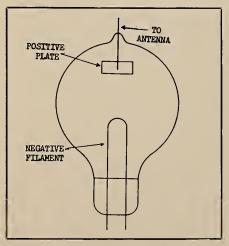


FIG. 1. Fleming's valve.

charged positively, it would attract the cloud of particles, thus establishing a current inside the bulb. (The cloud of particles was, of course, negatively-charged electrons attracted to the positive plate.) Edison patented this phenomenon, saw it named the *Edison effect*, then apparently forgot about it.

Not so an Englishman with the impressive name of Sir John Ambrose Fleming. This was 1904, and radio was the coming thing-if you could hear it. Sir John found that the Edison effect-because current flowed only during the positive half-cycle and in one direction only-had the effect of cutting the radio frequency in half, thus amplifying the waves. This half-wave action also converted AC to DC—rectification, as all projectionists know. Fleming constructed a device such as shown in Fig. 1, which he called a "valve" because of the valve-like action of electron flow. (Tubes are still called "valves" in England today.) Marconi saw that the valves could be profitably used in the headphones of the time, and thus the tube passed into radio and history.

DeForest's Audion

The trouble with Fleming's valve was that there was no control over the flow of electrons. When the plate was positively-charged, *all* the electrons tended to flow to it. Something was needed to control the flow. And along came Lee DeForest with an idea.

What DeForest did was to add a third element to Fleming's valve— a control grid between the filament and plate. (See Fig. 2). This was a mesh which could be charged positive or negative. When the grid was charged positive, electrons from the filament were attracted to it, and through it to the plate. Just how fast and how much was determined by the voltage applied to the grid. When the grid had no charge at all, electrons passed through it still, but to a lesser degree. And when the grid was negatively charged, naturally the electrons

were repelled. Thus, DeForest's tube—which he called the Audion—could successfully control the flow of electrons.

Now, a small change in the grid voltage will correspondingly produce a large change in the plate current. Hence any signal applied to this tube can be amplified hundreds of times over, and it is possible to obtain high

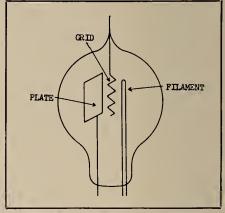


FIG. 2. DeForest's audion.

frequency current. Also, like Fleming's valve, DeForest's tube converted AC to DC. Though at first the tube contained gas, later on it was found that this was not necessary, and so it became the vacuum tube.

What is a Triode-Pentode?

There are almost as many "odes" in electronics as there are in poetry. Elements of a tube are called *electrodes*: the positive an *anode*, the negative a *cathode*.

Tubes are also classified by their number of elements. Fleming created a diode—that is, a tube with but two elements. DeForest added another element, hence he had a triode. Consequently, if you have a tube with eight elements, you have an octode . . . and so on. There are, to-

(Continued on page 22)

BOOK REVIEW

THE LION'S SHARE, Bosley Crowther, E. P. Dutton, 1957, 320 pp., \$5.00.

In New York City at least, Bosley Crowther, movie critic of the New York Times, is known as "King" Crowther. As far as prestige films go, if he pans 'em, the exhibitor had better look for a different occupation. Conversely, if he gives a feature the nod, there will be lines before the box-office before opening time.

Crowther himself is right in part when he maintains that it is not he, but the prestige of the good gray Times that wields such influence over the more adult audience. But it is also significant that he holds more honors and awards for his critical acumen than anyone else around, especially in a field where critics are not exactly overwhelmed with praise.

Now, in "The Lion's Share," Crowther has attempted to tell the story of the motion-picture industry through the chronicling of one studio: Metro-Goldwyn-Mayer. In spite of certain obvious limitations, he has succeeded pretty well. He has thoroughly succeeded in making the book readable and entertaining. And. with few exceptions, he has pulled no punches in delineating the pecadillos, both public and private, of all the meglomaniacs that, in spite of all, made motion pictures the fifth largest industry in the world.

(There is a possible exception: in researching this volume. Crowther worked in fairly close collaboration with Norma Shearer, and while this was invaluable to his portrait of Miss Shearer's husband, Irving Thalberg, somehow that family seems to get all the best of it in the book. In some cases deservingly so, but as one wag put it, perhaps the book should have been called "The Lion's Shearer." Let it be said that Crowther's appraisal of some others: Jean Harlow, Marion Davies, John Gilbert, and most notably, Louis B. Mayer, is objective but one may be objective about slicing up an onion.)

Suffice it to say, for the most fascinating inside account of how an undistinguished suburb grew into a universe we highly recommend this book. For the serious student of the social and financial side of the motion-picture industry, it is a must.

Answers to Projectionist Exam.

1.	(D)	5. (B)	9.	(D)
2.	(C)	6. (E)	10.	(D)
3.	(B)	7. (C)	11.	(C)
4.	(B)	8. (E)	12.	(B)



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EQUIPMENT INSPECTION

(Continued from page 7)

provided by the maximum-output adjustment.

Ten Items for Attention

Remember that projection quality is judged primarily by the brilliance, uniformity, and clarity of the projected pictures in the absence of gross defects, hence the need for constant vigilance in the operation of the arc lamps and close observation of the

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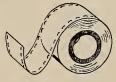
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focus. These are matters to be discussed later on; and we shall temporarily take leave of the topic of projection preliminaries with the following list of ten additional items which need more than cursory attention for smooth, trouble-free projec-

- 1. Upper magazine holdback tension.
- 2. Lateral adjustment of the flanged guide rollers. (See the article "Side-Weaving: A Common Projection Defect" in the December 1957 issue of
 - 3. Gate tension.
 - 4. Intermittent movement.
- 5. Gate door and intermittentsprocket shoe.
 - 6. Condition of the sprocket teeth.
- 7. Shutter timing. (One blade should be in the middle of its occultation, covering the aperture completely, when 2 teeth of the intermittent sprocket have passed a fixed point.)
- 8. Tension of the rotary-stabilizer scanning drum pressure rollers. (Is the sound afflicted by fluttery "wows" for a few seconds after each changeover?)
- 9. Soundhead lateral film-guiding rollers, especially in old-style soundheads. (Do you get frequent "motorboating" hum or frameline noise?)
- 10. Condition of the V, or positivecarbon guide in simplified HI lamps, or of the positive feed-and-contact head in rotating-positive HI lamps.

PROJECTION CLINIC

(Continued from page 13)

ily; and sometimes the welds are so poorly made that the wire spokes break loose from the circular rim. Spring-steel reels are peculiarly liable to "sprung" flanges-a nuisance to the projectionist who must always make sure that the flanges are "spread" for film clearance.

Welded-wire reels having spokes which have come unfastened from the wire rim are especially dangerous to film. We recently learned of a case where a brandnew print was severely damaged when wound on such a reel for projection. The unfastened spoke cut a gash in the film at regular intervals throughout the last few hundred feet of the roll. It is possible that a misaligned magazine and fire-roller assembly contributed to the film damage, but it is certain that the defective wire reel was mainly responsible for tearing up the print.

There is no time like the present to check the condition of your projection reels, no matter which type you are us-Welded-wire reels are excellent when in good condition, but they should be examined for welds which have come apart. Likewise, aluminum reels should be checked for cracked sides, and all reels for bent or sprung sides which may either scrape on the projector magazines or interfere with the passage of film. Run your fingers over the rims of your reels to make sure that there are no nicks or burrs to damage the edges of the film.

Have plastic 2,000-foot reels come into use yet for 35-mm projection? This writer hasn't seen any, and yet plastic reels have long been used for substandard projection and for magnetic sound tapes. They appear to be sturdy and free from many of the defects and weaknesses that have always plagued metal

Toothbrush Aids Projection

BELIEVE IT OR NOT, the teeth of projector sprockets benefit by frequent cleaning with-of all things-an ordinary stiff-bristled toothbrush! Only a special "dentifrice" is needed, namely,

Particles of gelatine emulsion, film wax, and dirt have a tendency to collect at the base of the sprocket teeth. Even though the deposits of dirt are microscopically small, they are hard and interfere with the steadiness of the projected picture when present on the intermittent



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sprocket. It is therefore advisable to brush the teeth of the intermittent sprocket at least once every day or two with a toothbrush lightly moistened with kerosene.

The teeth of the sound sprocket should be similarly cleaned at frequent intervals, while once a week is often enough for the feed and holdback sprockets.

It may seem that the simplest way to clean sprocket teeth is to switch the projector motor on and hold the kerosene-moistened toothbrush against the sprocket teeth. Well, if you do it that way you are taking a big risk! A rule we have long recommended is: Never oil or clean a projector while it is running! It may take longer when you have to turn the projector over by hand, but it is a lot safer. Don't risk damaging the equipment just to save time!

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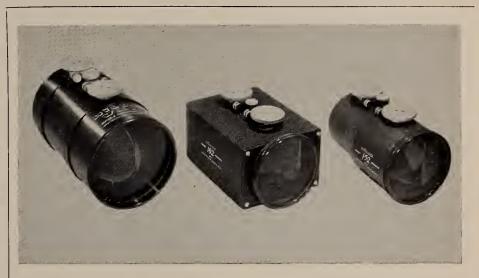
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WHAT IS ELECTRONICS?

(Continued from page 18)

day, somewhat complex types that are combinations, such as the *triode pentode*, a unit of three elements combined with a unit of ten. In these more complex types, other elements have been added, such as a *screen*, which is placed between the grid and the plate to reduce interference between the two. Such a tube is called a *tetrode*. In the *pentode*, another element, the *suppressor*, is added. The suppressor does exactly that: suppress what is known as *secondary emission*.

Emission is the process of releasing electrons, and this can occur in many ways. Of importance to the vacuum tube are (1) thermionic emission, (2) ionization, (3) secondary emission, (4) photoelectric emission, and (5) high field emission.

Thermionic emission is the release of electrons by heating a filament. which is what happens in the vacuum tube.

Tubes are heated in two ways: directly and indirectly. The directly-heated tube, or "filament cathode," is much the same as an electric light bulb—a glowing filament. But the primary purpose of the filament in this case is to boil off electrons, not give



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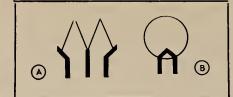


FIG. 3. (A) Filament construction; (B) symbol for directly-heated filament.

light. Filament materials are tungsten, thiorated-tungsten, or oxide-coated. Directly-heated tubes do not require much power, and are relatively inexpensive to use. You will find them in portable battery-operated receivers. (Scc Fig. 3.)

In an indirectly-heated tube, the filament merely serves as a heating agent to a chemically-coated sleeve which surrounds it, the filament being insulated from the sleeve. (See Fig. 4.)

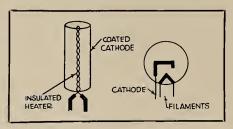


FIG. 4. Cathode construction and radio symbol for a cathode (indirectly heated).

The sleeve, not the filament, emits electrons. The indirectly-heated tube is considered more efficient than the directly-heated tube. It has better voltage regulation, less hum interference, and is a better amplifier.

Emission Processes

The emission process known as ionization was discussed in the previous article of this series. (IP, December 1957, p. 17 et seq.) Basically, it is the process in which an atom loses an electron by bombardment or similar means. Ionization causes current

flow in gas-filled tubes called thyratrons.

Secondary emission is caused when the electrons released from the cathode strike the plate and knock more electrons out of it. This lowers the performance of the tube, and is guarded against by the use of a suppressor, as noted above.

Photoelectric emission is brought about by the use of light on a metal surface. The surface of course, must be photosensitive, and the light must exceed a certain threshold value. The average phototube contains a photosensitive surface and an anode. It is either a vacuum tube, or contains some inert gas such as neon or argon, the gas tubes being the more sensitive.

Finally, high field emission is the giving off of electrons by use of a very strong electric field, although ordinarily the electric field in the smaller tubes is not powerful enough. In high-power transmitter tubes, the use of cooling fins is required. (Even your radio tube gets hot enough.)

The tube has come a long way from Fleming's valve to its present-day status, considering the cathode-ray tube employed in TV. Now with the challenge of the transistor and other semiconductors, its previous undisputed supremacy in electronics is being whittled away. But it seems reasonably safe to assert that the tube will be around in some form or other.

And what is the most expensive item among the tube's components?

The glass!

[TO BE CONTINUED]

French Equipment Here

The Andre Debrie Co. of France, large manufacturers of professional motion picture equipment, will now be represented in eleven western states by Gordon Enterprises of North Hollywood, California.





Correction from Todd

To the Editor of IP:

Your Projection Clinic article regarding Michael Todd's production, "around the World in Eighty Days," entitled "35-mm Favored" states: "The CinemaScope version, which the writer has not yet seen, may possibly be better photographed," (meaning better than the 65-mm version).

The 35-mm version of "Around the World in Eighty Days" is not a Cinema-Scope version, but was photographed in 65-mm, 24 frames/sec, and is an optical I.B. reduction print with an anamorphic squeeze of 1.567, and must be projected with a lens having an anamorphic expansion factor of 1.567.

The resulting picture, if projected with an aperture of .715 x .912, will produce a picture of 2-to-1 ratio. Due to white flashes from negative splice areas in the 65-mm negative, it is necessary to limit the vertical height of aperture to .675. This .675 x .912 aperture produces a ratio of 2.11 to 1. We have recently revised our specifications as to width, due to encroachment of magnetic striping into picture area, and are now recommending an aperture of .675 x .906, ratio 2.10 to 1.

"Around the World in Eighty Days" was also photographed at 30 frames/sec, 65-mm, and a direct contact print of this version is the one used at the Rivoli Theatre, New York, and at Mike Todd's Cine-

stage Theatre in Chicago.

"Eighty Days" also differs from Cinema-Scope inasmuch as it has no 12 K.C. frequency control superimposed on fourth channel surround track, but has three frequencies-30, 35, and 40 cycles, which may be used to control fourth track surround effects channel, using a Fairchild Integrator. Thus these superimposed frequencies are used to channel the surround effects into left, center rear, or right surround speakers, depending upon the superimposition of the various frequencies with respect to surround effects. If the integrator is not used, these 30-, 35-, and 40-cycle frequencies are filtered out, with the addition of a 60-cycle high pass and a 5000cycle low pass filter in the fourth channel, and all surround effects appear simultaneously in left, center rear, and right speak-

> P. C. Young Chief Engineer, Technical Div. Michael Todd Co., Inc.

New York, N.Y.

Passing the Buck?

To the Editor of IP:

I am enclosing a piece of damaged film that has caused a good deal of argument and speculation among local projectionists. (Ed. Note: heat blisters.) It is a clip from a feature returned from a drive-in in another city. Reels one and three were damaged almost their entire length. The sample is about an average. The burning varied from practically none at all to almost full frame.

The drive-in that returned the film claimed that it was in good condition when they shipped it.

Any comments about the cause of the damage or how it occured will be appreciated.

B. D. DOUGLASS

Des Moines, Iowa

COMMENT: Denying the responsibility for film damage is unfortunately a common practice in the exhibition field. If the print came to you in its present burned and blistered condition, it is obvious that the drive-in people who shipped the print need their glasses changed.

The fact that the odd-numbered reels were the more severely blistered indicates an inequality between the two lamps of the installation where the damage occurred. One lamp may have been getting more current than the other, or used without a heat filter. Our guess, however, is that the lamps were out of optical adjustment, the one that did the film-blistering being focused (possibly by accident) for maximum screen lumens—and, of course, for "hot-spot" screen illumination.

This type of print damage occurs principally with rotating-positive mirror lamps burning 9- or 10-mm positives at currents from 85 to 135 amperes. Because of the severity of the damage, we think that 10-mm carbons were burned at a current somewhat above 100 amperes, and that no heat filters were used. Variations in the burned areas indicate current ripple (proving that rectifiers were used) and slight flickering due to drafts or carbon overload, line-voltage variations, or dirty carbon contacts.

What to do about a situation of this nature? Refuse to project the print and immediately inform the exchange regarding the nature and extent of the damage. This will allow the distributor to bill the real culprits for a ruined print.

Some Imagination, Please

To the Editor of IP:

After reading Brother Joe Holt's very interesting article, The Release Print Problem of Standard Markings" in the September issue of IP, I would like to make a few additions, so to speak.

First: marking the end of the reel. I call this butchering, and I hope these marks are not made by IA projectionists. It seems that some "operators" are never satisfied with the laboratory marking for

Start Motor and Changeover cues, and insist on adding their own (and so on to the next run where that "operator" must add his own markings).

If the laboratory cue marks are indistinguishable—and I must admit that on many occasions they are dark or absent altogether—you can very easily go over the lab cues with one of the many fine cue markers on sale at your supply dealer. If someone doesn't want to spend the money, a home-made template will do nicely.

With all the competition motion pictures have, we should do everything in our power to give a better performance in the theatre, so that the customers we still have will continue to patronize us—and perhaps increase. TV still cannot give the performance or satisfaction that a large picture, clearly projected without sputter or interference (and cheap commercials), can provide. Folks still like to go out for an evening's entertainment with others, and a theatre properly run can supply that.

Let's also add a little imagination to our work. For example: during a run of Paramount's "The Pride and the Passion," I opened with my surround speakers. And if you saw this picture, you will remember that there is a beautiful cathedral scene where an organ and chorus are heard. Using the surround speakers again, I brought up the gain to give a semblance to the sound as it would actually be heard in a cathedral, and the effect was thrilling. So much so, the manager impulsively called up and told me so—and even called in the district manager to hear it.

Every day we hear about the stiff competition. For myself, I can say that this industry has provided me with a pretty good living, and I'm not going to be a party to any funeral.

Morris I. Klapholz

New York City

New GPL Engineering Site

General Precision Laboratory, Inc., has opened a new 22,000 square-foot engineering building at their site in Pleasantville, New York. It is the third major addition to the firm's facilities in two years, the others being an environmental testing laboratory and another engineering plant. The new plant will provide increased facilities in the field of military electronics.

Cinerama to Brussels Fair

One US representative at the International Fair which opens in Brussels, Belgium, in March will be Cinerama. Robin International, the import-export firm which handles Cinerama in England, France, Italy and Japan, has announced construction of a specially-designed theatre which will house 1,000 patrons. At the Fair's end, the Cinerama productions will be moved to a theatre in the city proper.

INTERNATIONAL PROJECTIONIST

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by the pinhole aperture, and the small amount of energy passed by the tiny hole may be kept on the lens surfaces without danger of damage for an indefinite time.

Necessary Background Information

Certain background information is necessary in order to make the best use of the pinhole aperture. For instance, it is possible that the screen surface in use will tint the light reflected from it in such a manner as to make the picture appear to be on the yellow side of white. If this is the case, it may be found advantageous to set the lamps just a shade on the blue side of white.

It is also frequently found that the auditorium incident lighting may add extraneous color to the screen, and this may make the best white light setting of the lamp appear to be less desirable than some other color of

Good practice will suggest the replacement of screen surfaces which do not respond properly to good illumination of normal color, and whatever the projectionist can do to keep auditorium light from the screen will be a step in the direction of better projection. But there is no gainsaying the fact that the pinhole aperture is an invaluable aid to consistently good screen light. For accurate and daily adjustment of the lamp, it stands without a competitor in the areas of simplicity, accuracy, and economy.

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Monthly Chat

Art for Art'\$ Sake?

The Organization Man, that phrase so redolently indicative of the purveyors of advertising along at least two famous avenues—Madison in New York and Michigan in Chicago (and vigorously despised by the denizens of both areas)—finds the "get it, see it TODAY" boys unorganized and articulate while the member of a Labor Union, ORGANIZED in the true sense of the word, is abysmally inarticulate.

Strange words, these, in IP? Not at all. Because even the writer of these words evidences a slight indentation in the cranial area after being hit repeatedly thereon by successive blows in the form of propaganda blockbusters dropped by those who are seeking a fresh cut of the long-sinced-baked pie now being purveyed in the form of backlog motion pictures to the retail grocery stores masquerading as TV stations.

In short: while writer, script-reader, producer, actor, director, script-holder and editor is vociferously articulate as to his "technical" rights to share in the proceeds of the sale of backlog motion pictures to TV, we hear not a sound even as loud as the falling snow from the "true" technicians, ranging from set workers to projectionists, who contribute to the financial success of *all* pictures, pre- and post-1958.

Why should this be so? Is it, perhaps, because in this age of Sputniks (the product, again of "true" technicians) the sights of the denizens of this economic jungle are elevated at such an acute angle to the skies (Jupiter being in the form of a glowing \$-sign) that they overshoot visually the level of a studio set or a theatre projection room?

What's to do about this situation? Well, the answer is, in the vernacular of he who never having confronted a situation need never have done anything about it, nothing. So long have the technical forces of this motion picture business—once haughtily referred to as an industry—been submerged in the morass of self-deprecation that they can only hope that the Errols and Lanas and Marilyns and Marlons and Frankies, from their non-technical artistic heights, scoop up great gobs of dollars from the TV-sales mine.

It may be assumed with as much good humor as may be mustered amid such a dismal surround that Heaven will persist in protecting the working girl and guy, and that they will derive from their highly organized status sufficient cover against the wintry blasts generated by the "artists" as they whizz by to stash their "takes" at the nearest bank.

The reader will surely gather that this little foray is a spoof. It sure is. But, hark! its central idea is no spoof, not even remotely funny to the estimable James C. Petrillo who, as is well known, also runs a Labor Union of technicians of varying degrees of artistic purism. And James C.'s boys get paid not only when the work is originally done but in perpetuity every time these sounds issue from whatever source.

Of course, James C.'s boys are sitting pretty until the advent of an all-electronic ensemble of musical instruments; and therein lies the tragedy of the "pure" technicians, whether on studio lamp catwalk or in the projection room. The "artists" have not only scored a smashing propaganda triumph in selling the notion that Nature merely imitates art but they have also defied Nature's dictum bearing on mortal man's susceptibility to the aging process.

This flaunting of the hitherto immutable law of aging may be bad genetics but it is magnificent chemistry whereby nothing is turned into something. Let's obliterate from the language for all time that hoary old phrase "the arts and sciences". The "artists" have finally enshrined the phrase "art for art's sake".—J. J. F.

What clicks at the box office?



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FEBRUARY 1958

Number 2

Inspecting and Repairing Prints

By ROBERT A. MITCHELL

Supplementing "Preliminary Equipment Inspection" in the January issue is this second of two articles on pre-show procedure which has a vital bearing on proper screen presentation

N THE WORLD of the movies, "the picture's the thing"—and the picture, as well as its accompanying sound, comes to us in the form of film. Inspecting and repairing all film which is to be shown is a most important part of the projectionist's preshow preparations.

At first thought, film seems almost too fragile to withstand the punishment of repeated projection via high-intensity arcs, yet with reasonable care it may be shown hundreds of times before it deteriorates in quality, and even thousands of times before it wears out altogether. But even new film is quickly destroyed by abuse! New prints, in fact, are more likely to suffer damage by improper handling than are old, well-seasoned prints.

Release prints are frequently damaged during shipment, but damage of this kind is not necessarily the fault of the transportation companies. Film exchanges frequently use damaged reels and ship out brand-new prints in battered shipping cases. And the trouble really begins when the edges of the film get bent and broken! Numerous splices are made in the prints; and when film splices are

poorly made, good projection is impossible. The effect on the action and dialogue is instantly noticeable.

A comparatively modern film-damage problem affecting new prints is created by drive-in theatres employing extremely high arc currents without adequate heat-reducing accessories. The "blistered-print" problem is also the responsibility of the exchanges, for they should insist that the owners of drive-ins and other large theatres buy and install heat filters

PICTURE DE PICTURE DE

A shows the result of excessive gate tension and too much tension on the upper-magazine reel spindle. Note that the corners of the perforations are torn on the pull-down edge. B illustrates the damage inflicted by worn intermittent-sprocket teeth and by narrow-tooth sprockets for CinemaScope magnetic-track prints. C shows the type of perforation damage caused by worn holdback-sprocket teeth and by excessive takeup tension.

and also water-cooled film gates.

Conscientious projectionists would welcome examination of their equipment by projection inspectors sent out by the film exchanges. It is unfortunate that so few exchanges care enough about projection conditions to hire competent inspectors to visit the theatres periodically. We know from experience that questionnaires submitted to theatre managers mean very little and accomplish nothing.

Another exchange practice which affects the welfare of the exhibition industry adversely is the booking of new prints into poorly equipped country-village theatres for the purpose of "breaking them in" before use in second-run city theatres.

Most projectionists understandably dislike "green" prints that "stick" and mess up the projectors with wax and emulsion; but a freshly processed film is assuredly not benefitted by use in worn-out, broken-down projectors that tear the sprocket holes and scratch the soft emulsion! Many a new print has come to an untimely end in the part-time picture-halls and improvised drive-ins of the "sticks."

The projectionist has a right to in-

sist upon receiving only prints in good condition, no matter whether the prints be old or comparatively new. Blistered prints should be rejected as totally unfit for use. Relatively new prints marred by deep scratches and torn "checked" sprocket perforations are cause for vigorous complaint, as are old prints containing poorly made splices and the multitudinous scratches which give the effect of "rain" on the screen. Still another print defect which should not be tolerated is a noisy soundtrack caused by scratches, sprocket-teeth indentations, imperfect magnetic striping in the case of magoptical prints, or exposure to deleterious magnetic influences in the case of all magnetic-track prints.

Equipment Condition Vital Factor

The use of magnetic sound striping and multilayer color emulsions adds considerably to print costs which are already much higher than they were in the days of nitrate stock. High print costs, however, do not absolve the exchanges from their obligation to supply prints in good condition and to protect new prints from abuse.

The competent projectionist exerts every possible effort to protect and preserve the prints entrusted to him by keeping his equipment in first-class condition at all times. The condition and adjustment of the fire-valve rollers, sprocket teeth, idler rollers, and gate tension are especially important. Heat filters are advisable when the arc current exceeds 75 or 80 amperes, and water cooling of the gate effectively maintains a low temperature of the film by blocking the absorption of heat by the perforation margins.

The projectionist admittedly cannot directly prevent bad film-handling practices indulged in by others, but he can, and usually does, support his complaints by the good example he sets, *i.e.*, by rewinding the film carefully, by using undamaged reels, and by making strong splices that last for the life of the print.

Adequate inspection of the 10,800 feet of film in a 2-hour show constitutes the projectionist's first contact with a new shipment of film. Never, under any circumstances, should even a new print be run directly from the exchange reels without previous rewinding and inspection. We have received on several occasions brand-new

prints containing unspliced cuts and even "S-bends" which would break in the projectors.

Pre-Show Inspection a 'Must'

Every projectionist has learned by bitter experience that inspection stickers on the reel bands mean little or nothing. Rolls of film which may have been in good running condition when they left the hands of the exchange inspectress can be injured by the bent reels and battered cases used for shipping them. And when the edges of the film get crushed, the projectionist may have to remove many feet even from a print which has never been shown before.

Brand-new prints which appear to be in good condition should be rewound with particular attention to the leaders. motor and changeover cues, and the mid-reel splices; but older prints require careful inspection of all splices and attention to the edges of the film to detect any torn sprocket holes that may be present. A length of perforations stripped through the middle may escape notice unless the film is run, slightly cupped, through the fingers during the first rewinding.

Extensive damage requiring the excision of substantial lengths of film sometimes occurs; and, as we all know, such defects as bent edges, long lengthwise tears in the perforation margins are not respecters of subject matter, and may necessitate butchering important scenes.

The excised damaged footage should always be returned to the film exchange; and in locations where the exchange can easily be reached, a demand for replacement footage or a complete new print should be promptly presented. Furnish the print letter, reel number, and the footage numbers at the beginning and the end of the

Imitation Is Flattery?

We do get around. The last we looked, the name of this publication began with International, and judging by the reprints of stuff that originally appeared here, we are that. Certain foreign mags have found IP's pages a fertile field—which we don't for a moment discountenance—but we should like to issue a small plea to those concerned: please credit IP. We're all of us capable of small larceny, but let's acknowledge the store we shoplifted from. We have, we think, done as much.

damaged lengths.

The hand rewinder should always be used for film inspection, and care must be exercised not to scratch the emulsion as the film passes, slightly cupped, between the thumb and middle finger with the forefinger resting very lightly upon the surface of the film to detect splices, which must always be examined for possible weakness and misframes. Since the films usually arrive at the theatre wound "heads out," each inspected roll must be subsequently rewound for showing, preferably by means of a motor-driven rewinder.

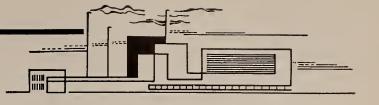
Film splices are still the bane of the projectionist's existence, and complaints are still directed at the splices made in certain film exchanges. "Hairline," or negative, splices are frequently unsatisfactory unless made on a heat splicer. Curved splices are particularly objectionable. The most satisfactory "cold-join" splice for release prints appears to be the regular straight-cut positive splice having a 1-hole overlap (approx. 3/16 inch). This type of splice has a sufficiently large area of overlap to withstand the strain of repeated projections.

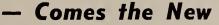
Anatomy of Splicing Fluids

A conventional or "cold-join" film splice depends upon the solvent action of the splicing fluid. Film cements are not glues or adhesives. They are solvents which partially dissolve the film base and weld the two pieces together. The composition of a film cement is accordingly dictated by the chemical constitution of the film base it is intended to weld. Acetone, for example, is one of the best solvents for nitrate base, while the triacetate safety base in use at the present time requires dioxane, a solvent which also works well enough with nitrate film to be used as the principal ingredient of socalled "all-purpose" cements.

The term "all-purpose" applied to a film cement must not be taken too literally, however. Both nitrate base and triacetate base are "esters" of cellulose obtained from cotton; but a new type of base, called Cronar, is a synthetic polyester resin. Cronar base is resistant to solvent chemicals, and hence cannot be spliced with conventional film cements. It may be glued together (an unsatisfactory procedure) or held together with a perforated transparent adhesive tape

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A TOTALLY DIFFERENT SYSTEM!

Light reflected to the screen by conventional type lamps is picked up solely from the flat, disc-like face of the arc source by a single mirror.

Since brilliance increases as an arc is constricted, air jets supplied by an integrated blower, have been arranged in concentric circles around the positive carbon and directed toward its burning end.

Due to the resulting THREE DIMENSIONAL, cylindrically shaped

light source, the available pickup angle is increased to more than 260°. Since the conventional reflector pickup angle is only 160°, an auxiliary 4-inch spherical reflector is located behind the positive carbon to utilize this increased availability of light. This auxiliary reflecRelotive position of corbons as rear lomphouse door is opened slightly.

tor picks up light from the arc and reimages it to the main mirror to be combined with the light from the crater. Total lumens are thus increased 12-15%.

The main mirror, on integrol part of the rear door, is of the cold gloss type, 21 inches in diometer—the lorgest ever put into regulor production.

For further details write

THE STRONG ELECTRIC CORPORATION
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YOU NEVER GO WRONG WHEN YOUR LAMPS ARE



ened and with mirror removed show focusing, cooling and carbon feeding components. known as Mylar. Although Mylar taped joins are very strong, there are objections, mechanically, to them.

There are two commonly used methods of scraping the emulsion from film to be spliced. The wet-scraping method depends upon the softening of the gelatine emulsion by moisture. The chief difficulty with wet scraping resides in the hard, thin binder layer of clear gelatine underneath the emulsion layer. The sublayer must be completely removed, but because it is transparent it is difficult to see. Then, too, removal of the emulsion in the performation-margin ends of the stub with a razor blade may tear away some of the film.

Dry-scraping with a small sandpaper block is more convenient and assures complete removal of the binder layer of clear gelatine along the entire length of the splice area. The resultant roughening of the film base increases the strength of the splice, but care must be taken not to thin down the base too much.

There is no danger of leaving sandpaper grit on the film, as some have imagined. Very few grains of sand come off good sandpaper; and, besides, the splice is gently wiped with a cloth to remove excess film cement before winding the splice into the roll.

Cement Application Technique

Apply plenty of film cement on the scraped stub, and apply it quickly with no more than two strokes of the brush. Be sure that the perforation-margin ends have received an adequate amount of cement, since the ends of a splice are subjected to great stress and strain. A splice that "lifts" at the ends (as many exchange-made splices do) is very likely to pull apart

in the projector. The splices made by many film-exchange inspectresses are weak because they are inadequately scraped and not enough cement is used. Splices stamped "OK" frequently fall apart, requiring the projectionist to make them over with the loss of time and two frames of film. Result: garbled dialogue.

Be sure that the splicing block you are using has a clean, flat clamping bar, and that the pressure of the clamping springs is strong and uniform. It is probably true that American projectionists must labor with the crudest splicing blocks in the world, due to the refusal of theatre owners to purchase modern hot-weld machines with automatic scraping, hence the need for extra pains when splicing film. The splicers found in many theatres were purchased in the days of silent pictures, and are now quite worn out.

Leave the splice in the splicing block about 10 seconds in the case of triacetate safety film, 5 seconds for nitrate film. Too long a time in the splicer weakens the join by permitting squeezed-out cement to dissolve the film base along the edges of the splice.

Sprocket Holes, Leaders, Cues

Sprocket holes which are severely cracked or checked at their corners and edges indicate that the print has been run in projectors having excessive gate tension or worn sprocket teeth. (Cracks at the bottom corners or edges indicate excessive takeup tension.) Damaged perforations may make the picture somewhat unsteady on the screen, and thereby furnish sufficient cause for a complaint to the exchange that supplied the film.

An occasional torn sprocket hole

may be "notched," or cut out smoothly to prevent tearing, but more than two successive torn perforations require that the film be cut and spliced. It is dangerous to attempt the projection of film from which the sprocket-hole margin on one side has been stripped away completely.

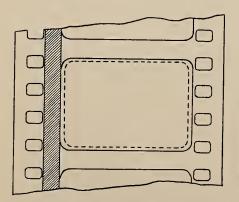
Leaders and cues demand special attention whenever prints are inspected. The very worst time for a film break to occur is during the changeover. Leaders are likely to be rather patched up because they are subjected to the wear and tear of repeated threading. Every splice in a leader should be carefully tested for strength and misframes. It sometimes happens that replacement leaders are spliced to the picture out of frame, or contain more than 3 feet of film between the frame marked "3" and the start of the picture. If the excess footage is not removed, and the projectionist forgets that it is there, the picture may be briefly blacked out when the changeover is made.

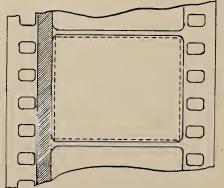
Special Cue Imposition

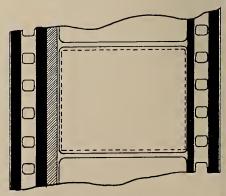
Experience has convinced us that the motor and changeover cues on release prints can usually by seen without difficulty. Only rarely does a print come along having cues so faint that they must be scored, or circled, to increase their visibility. Every projectionist dreads the prospect of missing a changeover; but is should be remembered that cues are projected upon the screen highly magnified, and are accordingly more prominent than they appear on the film.

A cue-marking device should always be used for scoring faint or nonexistent cues. There is no excuse for

(Continued on page 26)







A comparison of standard optical-sound film (left) and CinemaScope optical (center) and CinemaScope "magoptical" (right) prints. Note that CinemaScope film having combination magnetic and optical

tracks has smaller sprocket holes which require the use of narrowtooth sprockets. 20th Century-Fox is the principal distributor of magoptical prints. Clip these sketches for ready reference.

Whither The Motion Picture Theatre?

NO MORE important issue confronts the motion picture exhibition field -meaning you, Mr. Projectionist-than the probable effect of television upon the theatre box office. We deliberately chose the word "probable" because events of the past couple months seem to IP so persuasively indicative of what will happen in succeeding months, on a much larger scale as the video industry expands, as to be crystal-clear to all save the mananaboys and those who for no good and insufficient reasons prefer not to face the matter squarely.

Aware of the fact that there are almost as many differing opinions anent this topic as there are prognosticators, IP still adheres to its opinion of long-standing that TV will prove to be box-office poison. The basis for this opinion is provided by the appended summary of the

general situation.

First, a word about the production end of the movie industry. That these fellows will do all right no matter what befalls the exhibition field is apparent in view of the frantic rush by producers, players and technicians to board the video bandwagon. This development was inevitable because of TV's voracious appetite for film product. Hollywood can't lose, come what may, and they may be expected to abandon the exhibition field whenever their interests are served by so doing. Naturally.

... IP, 1948 ...

With TV receiver sales reaching for the two million mark right now and with a coast-to-coast video network expected to be available within little more than a year, the head-on collision of the two pictorial arts will occur much sooner than is generally anticipated-at least early enough to occasion considerable brow-wrinkling now.

In any event, nobody with the least degree of perception sees the motion picture theatre continuing to operate as presently constituted. Just what form exhibition will assume is anybody's guess, but the movie theatre adherents in general fall into the following slots:

- 1. Those who envision a straight TV theatre served by programs especially prepared for and transmitted to the theatre over a closed circuit.
- 2. Supporters of a combination motion picture film-TV program, with the video portion consisting mainly of special

In reviewing the mass of published data bearing on the motion picture theatre vis-a-vis home TV, a long-time subscriber to IP happened across a years-ago article in IP and was impelled to dash off an urgent communique which, referring to the appended article, stated in part: "For sheer prophetic vision this article has never been equalled in my long experience. It stands out like a beacon amid all the murk and muck surrounding this topic today, and it demands reprinting now verbatim down to the last italic letter". More than a bit startled itself by the content of this eight-year-old gem, IP ruefully obliges.

events, whether in the political, sporting or straight news realms.

3. Those who, counting upon the "novelty of TV wearing off," rely upon the natural gregariousness of humans to fill movie theatres. As one lover of his own phrases, with utter disregard for their meaning, puts it: "The only thing that will keep the American public at home is a broken leg." If this be so, even right now broken legs must be endemic in American homes.

'Novelty' Tag Proved False

Considering the last group first, every survey taken to date, including those embracing TV set owners of five-years standing, proves conclusively that the "novelty" of TV programs decidedly has not worn off; on the contrary, TV not only holds but continues to strengthen its grip upon its devotees. These are figures not opinions.

Another segment of Group 3 points to the continuing, even increasing, attendance at ball parks, dog tracks, the opera, etc., as evidence that the televising of such events has helped rather than hurt the box-office. This argument ignores the fact that in one instance the appeal is as between the pictorial and the actual performance itself-in short, flesh shows -while in the other instance it is a case of both media being pictorial. Still, the minor baseball league teams are up in arms about the telecasting of bigleague games from adjacent metropolitan areas.

. . . IP, 1948 . . .

A combination motion picture-TV program in a movie theatre poses many problems. First, there is the very tough problem of programming, precise timing being required. Second, the TV portion of the program must differ from that being telecast into the home. Why pay to see that which one may see for free? Moreover, the TV stations have demonstrated conclusively that they will never permit any pickup of their programs, and this bar will exist except for those few events which may be regarded as being in the public domain—the same program that goes to the home.

As for sporting and other events, motion picture theatres will have to bid competitively against both the TV stations and the giant advertising bankrolls of sponsors. Money will talk, and how, in this circumstance.

Much loose talk is heard about the delayed-projection method (recording the TV image on film for subsequent presentation) and the direct-projection method (instantaneous presentation of TV images). Apart from the terrific extra cost for equipment, transmission facilities and other corollaries to either of these methods, it so happens that the motion picture exhibition field doesn't have a transmission channel, or even a radio relay hookup, to its name. And nothing is being done about obtaining any-not surprising in view of the present unsympathetic attitude of the F.C.C.

... IP, 1948 ...

IP holds that the only possible chance for a survival of present motion picture theatres lies in presenting super-duper motion pictures of such terrific appealcolor, stereophonic sound, three-dimensional pictures-in such swelegant surroundings as to literally drag the customers out of their homes to theatres. The effort involved in this operation would have to be titanic, to say the least, to succeed.

Such a theatre, of course, would have to utilize TV equipment as an adjunct to its regular program for the covering of spot news and events of surpassing importance, so that their audiences would not be left wholly out in the cold.

There's no question, of course, that a nation-wide string of theatres could out-(Continued on page 25)

Operations Planning for Closed-Circuit TV

While the broadcast networks have been having their troubles, TV's kid brother, closed-circuit, has been getting healthier; projectionists should take note of the complex operations involved in a production.

By EDWARD F. ADDISS, Jr.

Director of Operations, TNT Tele-Sessions, Inc.

N THE NIGHT of September 23, 1957, several hundred thousand fans watched the TNT telecast of the Robinson vs. Basilio middleweight championship fight in 174 theatres and auditoriums in 131 cities throughout the United States and Canada. They saw this exciting match on large screens measuring up to 50 by 65 feet in outdoor theatres—3,250 square feet—the largest TV picture ever achieved.

Behind the scenes in setting up the largest closed-circuit network ever put together and one of the largest networks in the history of TV, went a tremendous amount of time and preparation by the TNT operations staff. This included shipping some 150,000 pounds of electronic equipment (valued at more than one million dollars) a total of 200,000 miles throughout the United States and Canada, to the theatres and auditoriums which showed the fight.

In 121 of the 174 fight locations, TNT arranged for mobile giant TV projectors which were installed specifically for the telecast night and then dismantled immediately thereafter. In addition, more than 25,000 miles of TV lines were ordered from the American Telephone and Telegraph Company and about 3,000 engineers and technicians were involved in the telecast itself.

Record C-C Telecast

The Robinson-Basilio fight, of course, holds the record as the largest closed-circuit telecast in the history of closed-circuit TV and it was also the 140th telecast in the nine years of TNT's history.

However, an event like the Robin-

son-Basilio championship fight does not come along too often. Most of TNT's tele-sessions business is in setting up closed-circuit business meetings for large companies such as Ford, GM, GE, Chrysler, IBM, and many others. These tele-sessions range in size from simple overflow types of meeting to a national network, such as the "Live Better Electrically" telesession, sponsored by General Electric in February 1956. This show kicked off the LBE campaign throughout the electrical industry and went to a 79 city hook-up, the largest business closed-circuit telecast ever done.

Setting up the operations and facilities for such a closed-circuit business meeting is a complex job requiring much advance planning and study by the operations department. Special AT&T long lines and loops must be

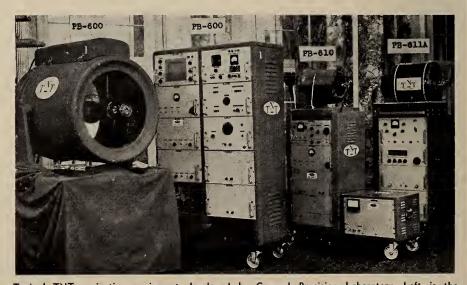
ordered to each tele-session location, hotel, auditorium, or theatre in the closed-circuit network. Projection equipment must be shipped to each location in the network.

Engineering surveys must be made of each of the rooms where the telesession will be shown, equipment is tested after its arrival at the tele-session location, local coordination between the sponsor's regional manager and the TNT engineer is established to coordinate local facilities. A test is made on the telephone loop, utilizing the projection machine and screen on the day prior to the tele-session, and a complete network test is made on the day of the tele-session some three hours prior to the actual telecast time.

The Equipment Line-Up

In the larger cities, the PB-600 models are used. (See illustration.) These normally project a picture 15 by 20 feet in size, but are capable of much larger pictures when the audience requirements demand them. The smaller models, PB-610 and PB-611A, are used in the smaller communities with picture sizes ranging up to 9 by 12 feet.

An example of how the operations plan for a closed-circuit tele-session works is provided in the recent telesession for the Plymouth Corporation, which went out to more than 20,000 dealers and salesmen in 41 cities on November 22 of last year. As soon as the tele-session was booked, the



Typical TNT projection equipment developed by General Precision Laboratory. Left is the large PB-600 barrel projector and its supply chassis. Next to that is the PB-610 used for smaller situations, and finally the new PB-611A with an advanced corrector plate design that was developed last year by GPL. (See IP, Telecasts, February 1957, p. 28.) Projection operations are a matter of cooperation between TNT technicians and IATSE men from the particular locale of the show.

operations department went to work.

The first thing that was done was to clear lines with AT&T to the 41 cities in the Plymouth network. The hotels and auditoriums were booked by TNT in each of the 41 cities, based on the number of dealers who were to see the show in each of the cities. This varied from as many as 2,000 in the largest cities to 150 in the smaller communities. At the same time, the operations department received from Plymouth the names of the local regional managers in each of these cities. This was required for advance coordination between the TNT and the client's representative.

An operations plan brochure especially prepared by TNT was sent out to each Plymouth regional manager and the TNT representatives, explaining the various factors of the tele-session as they affected each city.

As soon as the operations department had completed the bookings, these were forwarded to Plymouth and sent out to the field. The local telephone loops to each of these meeting places were then ordered to be installed specifically for this tele-session. The projection unit and screens were shipped to the hotels and auditoriums one week prior to the tele-session—November 15. As soon as the equipment arrived at the telecast locations, it was fired up and tested to make sure that it was operating properly.

Proper Placement of Equipment

A meeting was held between the TNT representative, the Plymouth regional manager, and the hotel or auditorium contact to determine the proper placement of the projection unit and the screen, and to order any other facilities that might be needed for the telecast itself, such as a lectern, microphone, and spotlight for local speeches, and banners, placards, or other display material for the tele-session room.

At this point the TNT operations department met with its facilities coordinators and AT&T to review the preparations for the Plymouth show and to lay out the pre-show testing procedures which are peculiar to closed-circuit networks. Final instructions were sent out to the TNT field forces, outlining these procedures in detail. The projection equipment was set up in actual tele-session position on the day prior to the tele-session and tested.

On the next day, from early morning to the time of the show, the equipment was tested again, first utilizing the local telephone loop. Then for three hours prior to the tele-session a complete national network test from the originating studios in Hollywood was conducted. This extensive pretesting is standard operating procedure on the TNT tele-sessions, not only to test the projection equipment itself, but also the AT&T facilities, long lines, and local loops to the meeting place.

Since everything is done on a mobile basis—with the projection units and the AT&T lines being set up especially for this one use and then dismantled immediately following the show—these elaborate preparations are necessary for the type of high qual-

ity performance the closed-circuit clients demand. At the scheduled time the Plymouth show, featuring Bob Hope, Lawrence Welk and his orchestra, Bill Lundigan and many other stars, went on the air to the dealers and salesmen throughout the United States. At the conclusion of the show, the equipment was dismantled and put into storage until the next tele-session.

The operations plan used for Plymouth was evolved after years of handling tele-sessions for clients and after certain methods had been tried. Although there are some small variations to the plan, depending on the client's requirements and the type of tele-session that is being done, the basic pattern remains the same. Truly, closed-circuit TV is big business.

New Cold-Light Mirror on the German Market

The Eugen Bauer GMBH firm of Stuttgart, Germany has announced production of a new cold-light mirror for incorporation into its Kino-Bauer projectors. Distinguishing characteristic of the new reflector, says the firm, is its surface coating on the arc-side.

The cold-light coatings are deposited by a vaporization process onto the mirror shell. Harder than glass, and having a higher degree of physical toughness. chemical stability and thermal strength,

heat light

Schematic illustration of the operational principle of a cold-light mirror. (Top) normal rear-coated mirror reflects back both energy components, while (bottom) surface-coated mirror allows heat to pass through mirror.

the coatings have a melting point of 1770 degrees C.

According to the manufacturers, the cold-light coatings reflect the visible light components only, the long-wave heat rays being allowed to pass through the coating unhindered to the rear side. The company claims that the cold-light mirror is less sensitive to pitting than the usual glass mirror because the surface coating is considered harder and more enduring than glass.

For demonstration purposes, color films were placed in the gate of Bauer projectors fitted with the cold-light mirror, and put under a 60-ampere carbon load in still picture projection, without damage to the film.

An economic factor, states the firm. is that the surface coating negates having to have a purer type of glass. In other words, the coating allows a mirror to be made of glass capable of withstanding very high temperatures—a type that is impossible to produce without bubbles or striation, but the chances of mirror-cracking are considerably reduced.

The cold-light mirror is also to be intalled in the Bauer Xenon Lamp BL 9 X, as well as into its standard arc lamps.

Bergman to MPAA Post

Maurice A Bergman has been appointed to the newly-created post of director of public affairs of the Motion Picture Association of America. Bergman, veteran film industry leader, will direct a special public relations campaign to bring before the public, press and industry the vital role which the American motion picture plays in the world today.

An object no larger than a thumbnail and only ten years old has caused a major revolution in electronics, and is rapidly reducing the vacuum tube to a minor role — the tiny transistor. Neglected for many years, the crystal has returned in a new role, and semiconductors have been able to accomplish what the tube could only do by expense and bulkiness. We are indeed in the era of the atom, and the advent of the transistor opens up fields that heretofore were not even to be considered.

What Is ELECTRONICS?

By JOHN SEARS

III. The Age of the Transistor

RYSTAL DETECTORS supposedly went out with the introduction of Lee DeForest's Audion vacuum tube into radio, or at least they were relegated to simple homebuilt radio kits. These early crystals were small pieces of galena (lead sulphide), or silicon. They were detectors, to be sure, but the vacuum tube could amplify and oscillate as well as be a better detector.

But since 1948, the crystal has been steadily getting back its own, and is now threatening to surpass the tube. All because William Shockley, W. H. Brattain, and J. Bardeen of Bell Laboratories came across—in the process of research—a crystal they weren't especially looking for. This was germanium. They found that not only was it a good detector, but it could be made to amplify and oscillate like the tube—and at much less power requirements.

Germanium is a fairly rare (and therefore expensive) grayish-white metal with an atomic number of 32, and is a semi-conductor—that is, it is a poor conductor and a poor insulator also. This is due to molecular makeup. Molecules, in form, are made up of lattice-like networks of atoms. While in pattern, the conductor molecule will have a free electron allowed to roam inside the lattice-work; the insulator has no free electron, and must remain rigidly in formation to preserve itself as an insulator. The semiconductor, as the name implies, is somewhere in between. It can be unbalanced. There may be more electrons than necessary in one place, less than necessary in another. Although semiconductors sound like poor relations, it is precisely this off-balance that provides their usefulness.

And germanium, as a semi-conduc-

tor, is responsible for the revolutionary transistor. (Trans—voltage across—a resistor.)

The Mighty Mite

By now, The Celebrated Man In The Street has heard pretty much about the transistor. He knows that it is something about the size of a thumbnail or smaller that enables him to have a pocket-size portable radio, a half-ounce hearing aid, a compact hifi set-and pretty soon a small portable battery-operated TV receiver (which will have to wait until the cost of transistors comes down more than it has). He has heard about its importance in electric computors, communications, Sputniks, etc. He may also have the idea it is a minute tube. It is not.

The first step in making a transistor is to obtain pure germanium by melting down and purifying germanium oxide. It is a property of germanium that addition of certain impurities will produce either positive or negative effects, depending on the impurities.

If you add small amounts of arsenic or antimony to molten germanium,

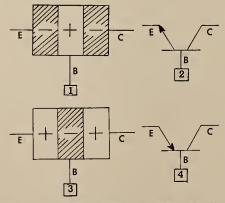


FIG. 1. Junction transistors. (1) NPN and (2) its symbol; (3) PNP and (4) its symbol.

you will get a negatively-charged (n-type) material; additions such as boron or aluminum produce a positively-charged (p-type) material.

The n-type has a number of free electrons, whereas the impurities in the p-type attract electrons, thereby leaving (for want of a better name) "holes", which act like positive space charges. It is the movement of these electrons and (sic) "flowing holes" that constitute the function of the transistor. "Flowing holes" are not exactly like carbonated bubbles in soda, but there is some comparison there. What is important is that both the free electrons and holes can be controlled, as electrons in a tube are controlled.

Junction Transistors

A small germanium crystal that is half n-type and half p-type is called, logically enough, an n-p junction—a diode. Electrons will flow from negative to positive, but very little in the opposite direction, thus the junction acts as a rectifier.

Figure 1 shows, in simplified fashion, two major triodes: the *p-n-p* and *n-p-n* junction transistors . . . electronic sandwiches. (Actually, the inner element in a junction transistor is thinner than the outer elements—the thinner the better.)

The p-n-p contains the negative between the positive. There are two contacts, the emitter and the collector, and a base connection. The positive emitter attracts electrons from the negative base, leaving holes. The holes, which are positive, attract electrons, leaving more holes further on moving toward the negative potential of the collector, but they are held by the impurities in the p-type germanium, allowing increased electron flow between base and collector—because each hole allows a

number of electrons through the collector. Thus, the emitter increases current flow between base and collector, and small changes in the emitter current cause correspondingly larger ones in the collector current—and you have amplification.

The *n-p-n* can be compared to the tube: the emitter corresponds to the negative cathode, the base controls like a grid, and the collector acts as the positive anode.

The Phototransistor

The phototransistor is a simple series circuit, unlike the triode junctions. Light falls directly on the germanium, altering its conductivity.

One such transistor, called a photo-diode, has been developed by Westinghouse. (See Fig. 2.) The photodiodes use the energy of light to control electric current, and are said to be 10,000 times more sensitive to light than the ordinary photoelectric cell, controlling as much current as 100 typical photoelectrical cells combined. Compared to the vacuum tubes, transformers, and other components for the ordinary photoelectric cell, the photodiode operates on a voltage as low as that from a 1½-volt dry cell or 6-volt storage battery.

This photodiode was produced by a new technique for *p-n-p* transistors. The conventional methods rely on delicate temperature control: a thin slice of *n*-type is placed between two layers of germanium and heated. However, too much heat will melt the *n*-type completely, and too little will leave the slice too thick—if you remember that the thinner the slice the better the performance.

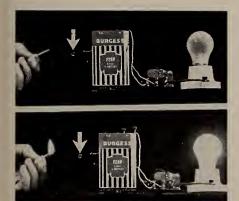


FIG. 2. Demonstration of the tiny Westinghouse photodiode (arrow) super-sensitive to light. The photodiode operates on voltages as low as 1½-volt dry cell or 6-volt storage battery. The photodiode acts just like the photoelectric cell in supplying power to the tube, as can be seen in the bottom part of this illustration.

The Westinghouse process calls for a cooling off period during heating, allowing a building up to desired thickness and uniformity. It is expected that the new process will produce transistors with better performance, capable of handling much higher frequencies than those in use at present.

The improvements that have come so rapidly to the transistor allowing for high-frequency work, plus its size, its small power requirements, and—in time—its reduced cost, may yet render the vacuum tube obsolete. But from a theatrical point of view, it appears

at present that since the majority of transistor application is channeled to military use, it may be some time yet before theatrical equipment will be completely or majorly transistorized.

However, the transistor's importance is beyond estimation. Consider that the Bell research group received the Nobel Prize for the invention of the transistor. The only ironic touch is that so much of transistor use goes into warlike preparation—and the Nobel prize was set up for peace promotion by a man who had only invented dynamite.

SOCIAL SECURITY LAW:

A Digest of Your Rights and Benefits

THE MOST IMPORTANT benefit this country provides is also the least understood. Since the majority of IP's readers come under Social Security, we here present this informative digest prepared by the Research Department of ILGWU. This month's installment, the first of three, is on old-age (retirement) benefits and tells (A) How to qualify for old-age benefits; (B) How to estimate the amount of benefit; (C) What benefits the wife or other dependents of a retired worker may get; and (D) How much you may earn after you retire.

(A) HOW TO QUALIFY FOR OLD-AGE BENEFITS

- 1. You must be at least 65 years if a man, or at least 62 years old if a woman.
- 2. Have sufficient employment to retire.
- 3. File application for benefits.

You must have earned at least \$50 in a sufficient number of calendar quarters in order to retire. A calendar quarter is a three-month period beginning January 1, April 1, July 1 or October 1. The number of calendar quarters you need depends on when you reach age 65 if a man or 62 if a woman.

(B) HOW TO ESTIMATE THE AMOUNT OF BENEFIT

The amount of your monthly old-age benefit will depend, in turn, on the size of your average monthly earnings during your working years. Follow these steps in order to estimate your monthly average earnings and the amount of your benefit:

1. List your annual earnings for every year between Jan. 1, 1951 and the year

you reach age 65 if a man or 62 if a woman.

- 2. For the years 1951, 1952, 1953 and 1954 don't list more than \$3,600 a year, even if you earned more than that in any of those years.
- 3. For 1955 and all the years after that, don't list more than \$4,200 a year, even if you earned more than that in any of those years.
- 4. Cross out up to five of the years in which you had your lowest earnings or no earnings at all. BUT in any case, make certain that at least two years' earnings remain in your list. (Thus, in 1957, not more than four years of lower earnings should be crossed out.)
- 5. Under certain conditions (described in next month's installment on disability benefits), you may also be able to cross out a period of disability from this list. BUT you must have permission from the Social Security office to disregard periods of disability in a "disability freeze."
- 6. Add up the earnings of all the years still on your list.
- 7. Add up the months in all of the years still on your list.
- 8. Divide the total earnings remaining on your list by the total number of months. The result is taken as your average monthly earnings.
- 9. Whether you are a working man or woman and if you retire at age 65 or after, the amount of your benefit will be equal to 55 per cent of the first \$110 of your average monthly earnings PLUS 20 per cent of the rest of your average monthly earnings. In no case will the benefit be less than \$30 a month.

BUT a working woman can retire between the ages of 62 and 65. If she retires before 65 (but after 62) the amount of her benefit is reduced by 0.56

(Continued on page 25)

The function of this department is to provide a forum for the exchange of news and views relative to individual and group activities by members of the organized projectionist craft and its affiliates. Contributions relative to technical and social phases of craft activity are invited.

In The SPOTLIGHT

THE MOTION picture industry, with one notable exception, has never won widespread recognition as one of the more enlightened groups in the socioeconomic area, which fact is certainly no news to the energetic Walter Reuther now locked in combat with the chrome-and-fin gentry in Detroit on the issue of a profit-sharing plan for his U.A.W. unionists. "Socialism" and "confiscatory" are just two of the less ponderous brickbats being hurled at Mr. Reuther as a result of his proposal.

From this vantage point we see nothing audacious about the Reuther proposal, because one of our very own motion picture enterprises, which certainly merits the tag of "industrial giant," has for many years not only gone along with but actually fostered the extension of just such a plan.

All Mr. R need do to win his little tiff going away is to point to the Eastman Kodak profit-sharing plan which has entailed the disbursement of hundreds of millions of dollars to its employees over the years and with inestimable benefit to Kodak. This company likes the idea.

Latest Kodak profit-sharing divvy for 1957-58: more than \$38,200,000 among 50,000 employees.

• Indicative of the acute problem facing the motion picture industry in Great Britain, no less than in this country, is the following excerpt from a recent statement by Sir Tom O'Brien, head of NATKE (National Association of Theatrical Kine Employees), British counterpart of our own IATSE:

"The policy of extending the showing of feature films on BBC Television and on commercial TV will have very serious repercussions on the cinemas of this country and on British film production in several ways.

"Television in the U.S., as is now well known, has had disastrous effects on American cinema theatres and to a certain extent on Hollywood, too. There seems to be no way in which British cinemas and British film production can escape a similar unfortunate experience if the releasing of features to TV goes unchecked.

"The cinema, with its new and progressive forms of technical production and presentation, could withstand the competition of live television shows as such, but when TV programmes are likely to devote most of their viewing time to film presentation it simply means that there will be a cinema in every home which has a TV set."

- The IA will hold its 44th bi-ennial convention in St. Louis, Mo., the week beginning August 4, 1958.
- Projectionists Local 143, St. Louis, Mo., will observe its 50th anniversary at



Albert Buckely, well-known British projectionist, is shown here with Morris and Mrs. Klapholz during his recent visit to this country. Buckley was the guest of the 25-30 Club during his stay in New York City, and Klapholz, as secretary of the Club, helped moke his visit a memorable one.

a celebration to be held March 10 at the Sheraton Jefferson Hotel.

- Malcom L. "Red" Townsend, member of Local 693, Brownwood, Texas, recently passed the 50-year mark as a projectionist. Townsend started his projection career when he was only 15 and during the intervening years has worked in but five theatres. That in itself is quite a record, we think.
- Gatewood W. Dunstan, projectionist in Norfolk, Virginia, recently, bequeathed his extensive collection of William S. Hart memorabilia to the Library of Congress, Washington, D. C. Long an ardent fan of Hart, Dunstan carried on an extensive correspondence with the famous Western star from 1929 to the time of Hart's death in 1946. In addi-

RECENTLY ELECTED OFFICIALS OF TORONTO LOCAL 173



Left to right: Lou Lodge, business representative; Arthur Milligan, president; Graydon Hulse, recording-secretary; Sam Wells, vice-president; and George H. Jones, secretary-treasurer.

W. Ingram, L. 253, Heads Model Projection Repair Shop

As head of the projection service department for the Schine Circuit, William Ingram, member of Local 253, Rochester, N. Y., takes great pride in his shop setup. It may be seen from the accompanying photos that the shop layout, covering an area of 30' x 60', is the result of careful planning, with each work section a complete unit. The shop is equipped to repair or recondition all types of projection equipment—from projector mechanisms to arclamp controls.

In addition to checking the projection equipment in the various Schine Theatres, Ingram also supervises the installation of new equipment. Assisting him in his work are Ernest Henley and Glen Howitt, also members of Local 253.

In the upper right-hand corner of this photo may be seen Ingram's office, complete with desk, typewriter, file, phone, etc. In the cabinet next to the office space are stored various small machine parts, which are easily accessible.





This photo shows the work section of the shop. In the upper left corner is shown the DC test panel for testing arc lamps and arc control mechanisms.



Shown here are the infrared ovens used for baking enamel on numerous projector parts.



In this section of the shop are stored the repaired mechanisms, ready to be shipped at a moment's notice to any theatre of the circuit needing a replacement.

tion to letters, the collection includes several hundred motion pictures and scripts, photographs, books, and other souvenirs of the cowboy great.

• The Academy Awards telecast March 26 will not be presented on any theatre screen. A number of Hollywood unions firmly denied waivers for the presentation; however, this will not prevent theatres from showing the telecast on regular TV sets in lobbies or lounges. No formal requests for waivers had been made, but they would have had to have been made to all talent guilds, musicians union, music publishers etc. And no one

could give a guarantee that every theatre would exclude paying patrons. All things considered, it was too much of a legal problem.

- Not many Local Unions cover as vast an area as IA Local 401, Centralia, Wash. Chartered in 1914, this Local covers 9 cities in the four southwest counties in the state of Washington.
- Schine's Eckel Theatre in Syracuse, N. Y., was completely remodeled to the tune of about a quarter of a million dollars for the presentation of "This is

Cinerama." The Cinerama premiere at this theatre, which was held several weeks ago, was sponsored by the Syracuse University for the benefit of the University Alumni Scholarship Fund.

IA ELECTIONS

LOCAL 171, PITTSBURGH, PENNA.

James A. Sipe, pres.; John C. Snyder, vice-pres.; Luther W. Thompson, sec.-treas.; James V. Sipe, bus. rep.; Barney Krenn, sgt.-at-arms; William Thompson, Martin Torreano, Michael Gardner, executive board; James Caskey, Bernard Lauth, Jerry Mickloucich, trustees.

LOCAL 249, DALLAS, TEX.

Herschel O. Miller, pres.; John B. James, vice-pres.; Harvey D. Hill, Jr., rec.-sec.; Curtis J. Moore, fin.-sec.; Harvey D. Hill, Sr., bus. rep.; Luther C. Clark, Sam Hoffman, Jasper Barron, trustees; James M. Blaydes, Jr., sgt.-at-arms.

LOCAL 262, MONTREAL, CANADA

Lucien Cote, pres.; Armand Besse, vicepres.; Joe M. Reynard, sec.-treas.; Benny LaHaye, fin.-sec.; Earl McClintock, bus. rep.; Roger H. Provost, sgt.-at-arms, Joe Frackt, Wilfred Pare, Gerald Nadeau, executive board; Pierre Porteneuve, B. La-Haye, Jack Ghilsig, delegates to Montreal Trades and Labor Council.

LOCAL 332, CLINTON, IOWA

Chauncey Andrews, pres.; C. Tintey, vicepres.; A. E. Hubbard, sec.-treas.; Paul Nadelhoffer, bus. rep.; C. E. Baker, Charles Snyder, C. Tintey, trustees.

LOCAL 343, OMAHA, NEBR.

Alvin Kostlon, pres.; R. V. Mortenson, lst vice-pres.; Ross Hatton, 2nd vice-pres.; R. L. McIntyre, sec.; Art Krake, fin.-sec.; V. Beck, treas.; Clyde Cooley, bus. rep.; A. L. Frazier, sgt.-at-arms.

LOCAL 348, VANCOUVER, B. C.

Lyle E. McManus, pres.; William D. Graham, vice-pres.; Douglas Calladine, sec.; Frank Smith, Sr., treas.; Les Walker, bus. rep.

LOCAL 401, CENTRALIA, WASH.

Harry Kirkpatrick (Longview), pres.; John J. Cunlisk (Vancouver), vice-pres.; Charley W. Wheeler (Vancouver), sectreas.; Lowell L. Wheeler (Vancouver), rec.-sec. Bus. Reps.—N. D. Stark for Vancouver-Kamas; H. A. Kirkpatrick for Longview-Kelso; and W. A. Kirkpatrick for Centralia-Chehalis. C. L. Leach (Kelso), sgt.-at-arms; Mike Greenleaf (Longview), W. A. Kirkpatrick (Centralia), N. D. Stark (Vancouver), H. Kirkpatrick, C. W. Wheeler, executive board; C. E. Staples (Centralia), J. R. Spiker (Longview), C. L. Leach, trustees; C. W. Wheeler, IA Convention delegate, and Wayne Kirkpatrick, alternate delegate.

Projection CLINIC

Conserving Trailer Titles Aids Showmanship

TELEVISION projection is frequently marred by sloppy changovers from one projector to another, or from a projector to a live camera, and *vice versa*. Opening and "The End" titles are clipped, music often being abruptly terminated in the middle of a bar.

The conditions under which a TV projectionist works are vastly different and more exacting timewise than those prevailing in theatres, so perhaps we should not be too critical of the assaults upon our visual and auditory senses which pour into our living rooms from the ubiquitous TV set. But theatre projectionists should guard against following such a bad example and inflicting similar atocities upon the moviegoing public.

The open and close titles for the "previews of coming attractions" are a case in point. These title strips are cut and respliced with every change of program, and, as a consequence, gradually become so short that there is a real danger of losing a few notes of the accompanying music. Clipped music sounds bad and reminds the audience that they are listening not to a real orchestra but to an indifferently presented "canned" performance.

The ideal remedy for this difficulty is, of course, frequent replacement of the trailer titles. Many exhibitors, however, won't spend a penny for new title films as long as a single foot remains of the old ones. The projectionist is thus forced to conserve such films as best he can

Open and close titles usually begin and end with fades. To preserve these fades intact, splice to the beginning and end of each title about 24 frames of black film having thin framelines and a silent black soundtrack. The splices should be blooped with movietone lacquer to prevent clicks in the sound. After repeated cutting has reduced the strips of black film to a length of 6 or 8 frames, replace with new 24-frame lengths. The full effective lengths of the open and close titles will thus be preserved for a long time.

Projector Carbon Care

ARCLAMP carbons are a consistently uniform product. They comprise an outer shell of hard carbon and, in the case of high-intensity positives, a core

of softer carbon mixed with "rare-earth" compounds to produce a luminous flame, or gas-ball. The hard shell consists of lampblack, tar, and pitch converted to a coke-like form of pure carbon by baking.

After manufacture, the carbons are carefully inspected for cracks and other defects. X-ray examination is employed to detect imperfections in high-intensity cores. The carbons are finally smoothed and pointed, and copper-coated in the case of certain neatives and non-rotating positives. The projectionist may be confident that his carbons left the factory in perfect condition.

Carbons are nevertheless subject to damage which may be either permanent or temporary. A box of carbons which has been dropped will undoubtedly contain cracked as well as completely broken carbons. Cracks in copper-plated carbons are seldom visible, and make themselves evident only when the light flickers and becomes dim and discolored due to loss of the luminous gas ball. Carbons are sometimes cracked by rough handling during shipment.

Type of Damage Governs

Not all cracked carbons are unfit for use, however. The small lengthwise cracks caused by excessive moisture in the carbon "dough" during the manufacturer's baking process do no harm. It is only the deep oblique and circumferential cracks which may cause loss of light. flickering, discolorations, and faulty feeding.

Wet carbons burn badly; and even if the intense heat of the arc does not crack them, they sputter and produce a flickering light. Fortunately, however,

How's the Ol' Interlock? 3-D's Back

Well...back to dodging rocks, spears and lion charges. Warner Brothers has re-released "House of Wax" coupled with "Phantom of the Rue Morgue". It's for New England saturation. damp carbons which have been dried are as good as new. Wet carbons therefore need not be thrown away unless oil or a chemical has been spilled upon them.

Because carbons are porous and readily absorb moisture from the air on damp days, it is advisable to warm them for some time before use in order to dry them out. A few boxes of carbons may be kept on a radiator or stored near a rectifier or ballast rheostat. Many projectionists keep a dozen or so positives and negatives directly under the lamphouses, if there be room, and are thus assured of having a thoroughly dry trim at all times. This simple precaution pays off in brighter, whiter, steadier screen light.

Observation Ports

We have offered advice from time to time anent projector ports—but what about those ports through which the projectionist views the screen? The excessively small observation ports seen in the rank and file of motion-picture theatres all over the world appear to have been designed to prevent the projectionist from seeing the picture! Observation ports are too often badly peep-holes of Lilliputian size.

A full, clear view of the screen by the projectionist is absolutely essential for good projection. If the projectionist can't see the screen clearly at all times, how is he to maintain a sharp focus and good screen illumination? When the glass in the observation ports is warped, discolored, and dirty window glass, how is he to detect incipient travel-ghost and other minor flaws when they first occur?

Why Not Large Ports?

Now that acetate safety films are used almost exclusively, municipal and state laws restricting the area of observation ports should be rescinded. We believe that ports 12 inches high by 15 inches wide are none too large in these days of wide screens. Sufficient height should be provided to permit the projectionist to see the screen without having to stoop or stand on his toes.

The glass in observation ports should be high-quality colorless plate glass tilted downward to minimize annoying reflections that interfere with clear viewing. It is better to have the dark floor, rather than a light-colored wall, reflected into the projectionist's eyes. Then, too, the glass should be readily removable for daily cleaning and for checking the picture for travel-ghost during test runs. We deplore the necessity for an extension ladder to clean the outside surfaces of the port glasses.

Utilizing a new system trom overseas, Strong Electric Corp. introduces the latest in its high-intensity line.

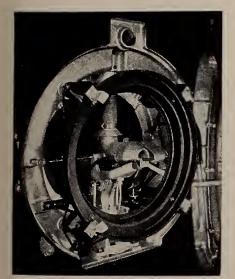
Strong's New "Blown-Arc"

STRONG ELECTRIC CORP. has unveiled its new projection arc lamp at the Drive-in Theatre Show at Louisville, Kentucky, envisioning much better light output not only for the projection of 35-mm film, but also CinemaScope, and on the largest screens, with a 51 per cent increase in light volume when using the f:1.7/f:1.8 lens. It is maintained that this volume of light is not dependent on the use of a lens faster than f:1.7.

Ratings for the lamp are: 46,000 lumens when projecting small aperture 35-mm pictures (.825 x .600); 55,00 lumens for CinemaScope 35-mm (.912 x .715); 56,000 lumens for MGM 65-mm and Todd-AO 70-mm; and 65,000 lumens for Fox Cinema-Scope 55-mm (1.340 x 1.06).

The lamp is so rated that 100 per cent distribution of light can be attained over the entire screen area, and a minimum in-focus distribution of 80 per cent when projecting through a 35-mm aperture with f:1.7 lens.

The lamp utilizes a different lightproducing system than that of present commercial techniques. The initial development of the new system, known as the blown-arc, was made by Dr. Edgar Gretener of Zurich, Switzerland. Strong has obtained an exclusive license to manufacture lamps using this technique in the United States. The



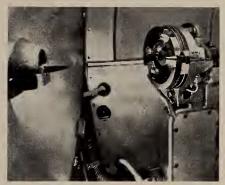
Strong Blown Arc lamp with rear door opened and mirror removed to show focusing, carbon feeding, and cooling components.

system is based on the principle that the brilliance of an arc increases as it is constricted.

Use of Air Jets

Constriction of the arc has been accomplished by air jets arranged in concentric circles around the positive carbon and directed toward its burning end. The air pressure at these jets is supplied by a blower which is an integral part of the lamp.

Due to the resulting cylindricalshaped light source, the light pickup angle is so engineered to be increased



Strong Blown Arc projector lamp showing relative position of positive asd negative carbons as rear door is opened slightly.

to more than 260°. Since the conventional lamphouse reflector pickup angle is only 160°, an auxiliary 6-inch spherical reflector was located behind the positive carbon to utilize the increased available pickup angle. This auxiliary reflector picks up lost light and re-images it to be picked up by the main mirror and combined with the light that is picked up directly



New Strong Blown Arc projector lamp.

from the crater. The auxiliary optics are maintained to increase the total lumens on the screen by 12 to 15 per cent.

The 10-mm x 27-inch non-rotating Ultrex positive passes through and protrudes $\frac{3}{8}$ inch from the carbon contacts in the opening in the center of the auxiliary mirror. Burning in conjunction with this positive at 140 to 160 amperes and 70 to 78 volts is a rotating 7/16- x 9-inch solid graphite negative carbon which is inclined at an angle of $8\frac{1}{2}$ ° to the positive carbon. Alternates for the positive may be 10-mm x 25-inch Hitex burned at 125 to 140 amperes, or 10-mm regular positives burned at 110 to 125 amperes.

The main mirror, an integral part of the rear door, is 21 inches in diameter and of the cold glass type. It has a focal length of $6\frac{1}{4}$ inches and a working distance of 42 inches. All film sizes can be projected without change of reflectors.

The spot size at the aperture can be changed from the smallest to the largest by shifting the position of the main reflector by means of a convenient control. This eliminates chang-

(Continued on page 26)

Basic Data Anent Ventarc "Blown" Arc Readily Available

FIRST PUBLICATION of basic data relative to the Ventarc high-intensity "blown" carbon arc, now the topic of extended discussion in film industry technological circles, occurred in IP almost eight years ago (to be exact, in the issue for August, 1950, p. 13 et. seq.). This article, providing a rich fund of information anent this arc for those seeking further information in explicit detail, and written expressly for IP by Dr. Edgar Gretener, of Zurich, Switzerland, inventor of the system, comprised five pages and 10 illustrations under the following sub-divisions:

General Aspects, The Projection Lens, Film Characteristics, Illuminating System Requirements, The Light Source, Ventarc Feed Control, "Blown Arc With High Current Densities"; Negative Electrode Problem, and Ventarc Lamp Light Output. This pioneer publishing effort, only one of many IP "firsts" in the audio-visual technological area, contains type matter and line drawings which lend themselves readily to photostating at any of the many libraries where IP is on file.

AUDIO · VISUAL

Motion Pictures Go Academic-But . . .

THE ART and the techniques of picture making are now being taught in 970 colleges and universities in the United States, with workshops where students have a chance to create and produce their own films, according to a study made by Alfred F. Corwin of the Motion Picture Association of America. Long ignored as an art form by the academic world, now some eight colleges and universities offer Bachelor degrees to students majoring in the field. Four of these offer Master's degrees: Southern California, Columbia, CCNY, and Boston. The main reason given for the increased attention to communications arts is the rapid rise of TV.

But, strangely enough, although increased attention to application and appreciation of motion pictures is vital to Hollywood-not to mention the potential technical and artistic talent these courses will produce—the motion picture industry as a whole has done little to encourage or support these programs. Film companies have cooperated to the extent of supplying prints for classroom study-about 70,000 now in circulation. And key industry personnel have lectured at various schools. But it is not Hollywood but rather the A-V field that has supplied the best training tools to this comparatively new addition to the curriculum.

An indication of what might be the trend in policy is the move made by New York University, where this year the radio, TV, and motion picture departments have been organized into one coordinated department, with the idea that the three media should not be arbitrarily separated. The first two years, the student receives basic fundamentals, and specializes in his third and fourth year. According to Prof. Richard J. Goggin, chairman of the department: "We are aiming at graduates who not only know how to operate a Bell & Howell, but who are also concerned with the ideas a film represents. Our most difficult task, in fact, is to get students to think in terms of ideas as well as techniques."

Victor Visual Oiling

Victor Animatograph Corp. has introduced a new visual oiling system for its full line of 16-mm sound and silent motion picture projectors. The company states that the one spot oiling system now features a clear lucite filling tube and reservoir cover.

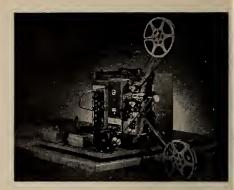
The transparent oiling container is to permit the user to check the oil level at a glance, to eliminate guesswork.

The oil reservoir meters lubrication to proper points automatically as needed, for the necessary smooth, quiet operation and protection of the parts. Victor maintains that the motor in all its projectors is lubricated for life.

Kodak Lip-Sync Kits

THREE NEW sound-synchronizing kits as auxiliary equipment for the Kodak Pageant Magnetic-Optical sound projector are now being marketed to simplify production of 16-mm magnetic lip-synchronized sound motion pictures. These recording aids are: Kodak Synchronizing Brake Kit, Kodak Synchronous Motor Kit, and Kodak 2-Projector Synchronizing Kit.

The sound-synchronizing kits make possible: use of the Pageant projector for on-set recording of lip synchronized sound; preview and editing before sound and picture are combined on one piece of film; combination of sound and action into one synchronized master print; pro-



Kodak synchronous motor kit and Pageant projector for on-set recording.

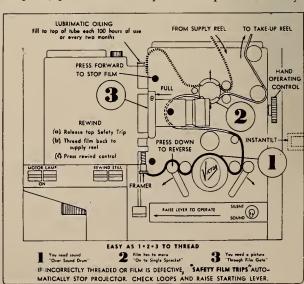
duction of duplicate in-sync sound tracks.

Without auxiliary equipment, the Kodak projector records a magnetic sound track on any film to which a magnetic stripe has been added. With the new kits, the projector may be used as an on-set recording unit to sync sound perfectly with a synchronously-driven taking camera.

The Kodak Synchronizing Brake Kit is a device for on-set recording of sound effects and dialogue in synchronization with the taking camera, and consists of a nylon spool and a braking strap which permits the user to set the recording speed of the Pageant projector precisely at 24-frames-per-second sound speed. A rotating stroboscopic pattern on the spool is adjusted by means of the friction braking device until the pattern appears to stand still when viewed under neon or fluorescent light. The projector is then in sync with the taking camera.

The Synchronous Motor Kit does the same as the manual braking kit, but automatically. It consists of a synchronous motor, motor pulley, projector pulley, and timing belt.

The 2-Projector Kit is designed for those firms that wish to edit their own films and produce duplicate sound-syn-



Position of the visual oiling system in relation to the Victor projector moving parts. chronized prints. Consisting of two projector pulleys and a timing belt, the kit interlocks two projectors to run in step. The kit may also be employed to play back a separate magnetic or optical sound track in sync with the corresponding picture film. Thus, sound and action may be previewed and edited before the two elements are combined in a single film.

Component parts of the 2-Projector and Synchronous Motor kits are available separately.

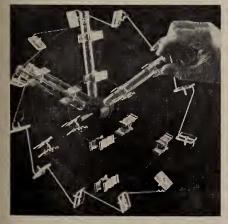
TV Flight Simulator

LINK AVIATION, INC., developers of the famous Link Trainer, are now producing the Link Visual System, Mark IV, a closed-circuit TV system that projects an airport panorama in front of a flight crew as they "land" or "take off" in an electronic flight simulator. The system will enable flight crews to familiarize themselves with DC-8 jet transport operations before actually taking the plane up. It is the first use of TV in flight simulation.

The TV system comprises a scaled three-dimensional model of an airport. A TV camera mounted on a track parallel to the model projects a picture on a screen in front of the simulator—a DC-8 pilot's cabin. The camera's movement. as it pans along the track, is synchronized with the speed, altitude, and direction of the simulator as it is controlled by the pilot. The airport appears exactly as it would be seen by the pilot in actual flight.

United Air Lines has ordered the system for its flight crews.

KODAK'S PHOTO PADDLE WHEEL



This water wheel helps turn out better pictures at Kodak. Designed to hold small quantities of exposed film used in controlling quality, the plastic wheel is turned by the flow of cold water used to keep developer temperature constant. The turning wheel agitates the small quantities of developer in the attached test tubes and insures uniform development of the film.

New Products for the Industry

A New Combination spotlight and electrical circuit continuity tester for low resistance circuits has been produced by Bright Star Industries of New Jersey. The new model features a 50 per cent



Bright Star combination spotlight - circuit continuity tester.

increase in capacity, a built-in jack, and can be used without adjustments, as a flash-light. The Bright Star Continuity Tester, No. 1625CT, works through three 1½ volt size D flashlight batteries, and has a number of uses: checking wiring, controls, circuits, fuses, grounds, shorts, opens, broken wire, switches, limits, relays, burglar alarm systems, and checking and setting contacts as desired.

By using two testers, in series, it is possible to check wiring or controls and cables of approximately 1500 feet, 18 gauge copper tinned wire, to 7500 feet, 12 gauge copper tinned wire, at two different places where two persons cannot see or hear each other. The length of wire that the new model can test is said to be 50 per cent longer than previous two-cell models.

The Bright Star tester is not intended to be used as a voltage tester, or on live wiring, nor is it intended for use in testing TV or radio receivers.

RAYTONE SCREEN Corporation, New York, has put on the market screens with a surface containing a new type of non-yellowing ingredient: XR-170. Designed for both wide and narrow auditoriums, the screens are said to provide the high center light return of metallic-surface screens. At the same time, it is claimed, the screens provide good image to side-seat patrons, even in wide auditoriums.

TITEFLEX QUICK-SEAL couplings and flexible metal hose, through which water runs to cool the projector aperture, have been developed for MGM studios to facilitate quick changes from standard 35-

mm to the new MGM Camera 65. Since this switchover requires changing the back plate of the projector, this also necessitates disconnection and reconnection of the water cooling system. Before the advent of Quick-Seal, the operation took some time and trouble, with leakage of water. Quick-Seal is said to immediately seal off water flow when disconnections are made.

Freon TF, DuPont's film cleaner, is now being distributed by the John B. Moore Co. of New Jersey. Originally produced as a refrigerant, Freon has shown excellent properties for cleaning both color and black-and-white film. The solution is said not to harm magnetic sound tracks, magnetic oxide coatings, acetate or Cronar polyester bases. Besides cleaning, addition of small amounts of high-melting paraffin wax or silicones to Freon makes for good lubricating qualities. Freon TF is non-flammable and non-explosive.

THE STARLIGHT TURNTABLE 80 has been introduced by the Metzner Engineering Corporation of California. Features include: continuously variable speed control from 16 to 84 rpm; a center drive; a built-in illuminated stroboscope that makes provision for exact speed adjust-



The Starlight Turntable 80.

ment at all four speeds; an automatically retracting 45 rpm center hub.

The 3½-pound machine is centerdriven by the motor shaft, eliminating the belt or rim drive. The stroboscope makes provision for exact speed adjustment, while a filter eliminates annoying speaker pops when the power switch is operated. Wow and flutter are said to be held to less than 0.25 per cent. rumble 40 db below NAB standard level.

MITCHELL'S MANUAL OF PRACTICAL PROJECTION



More on 5-to-1

To the Editor of IP:

I have read with great interest the highly explanatory article by IP's expert, Robert A. Mitchell: "Projection With Hi-Speed Intermittents," in the November issue.

International Projector, manufacturer of Simplex machines, is the first American projector manufacturer to offer a real high-speed and efficient intermittent movement as optional equipment for X-L machines. Without a doubt, this is a practical and tangible advance in projection technology.

More rapid pull-down mechanisms have been advocated in the past, and perhaps the first machine since I946 employing an accelerated pull-down movement was the Radion II, manufactured in France by the Cameca Co.

The Simplex accelerated intermittent, however, has a fundamental principle in design which makes it completely different when compared with the French machine. The Simplex rapid mechanism has the three main shafts' axes located in a common vertical plane, so the maximum acceleration phase is applied in the complete geneva cycle. However, the acceleration phase of the slipper-block drive on the Radion II machine is located in an off-set position (called "angle of asymmetry") and thus, the highest phase of acceleration produced by the off-set drive only takes place in the deceleration of the geneva star. This point would be clearer if the reader will compare the drawing that appeared with my article, "Faster Pull-down Geneva Movements": IP, January 1957, p. 13, Fig. 13, with the drawing in the Mitchell article: IP, November 1957, p. 9, Fig. I.

It seems that this geometrical arrangement on the French movement makes it more quiet, without any disturbance on the upper loop, and also makes it almost unnecessary for any readjustments to the gate tension pads, etc.

However, the Simplex advance in the field is perhaps one of the most important in the new American trends in projector

design. Mr. Mitchell, in his valuable article, makes a brilliant explanatory dissertation on many dark points for the average projectionist in relation to various complex functions of modern projection machines.

Jose M. Ruiz

Santa Clara, Cuba

to Mr. M. Although CinemaScope pictures are occasionally sharp and undistorted, they are more often inferior to ordinary "wide-screen" pictures projected via cropped apertures and short-focus lenses. Anamorphic lenses cause more or less deterioration of the image, especially toward the sides of the picture. Some of this loss of resolution is present on the film; still more is created during projection.

Although the sharpest CinemaScope prints projected with lenses of the high-

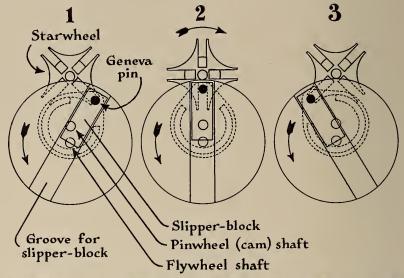


FIG. 2. The Simplex X-L Hi-Speed movements with shafts in alignment, as illustrated for Robert A. Mitchell's article of November, 1957.

CinemaScope Focus

To the Editor of IP:

Here's my problem: I use Super Simplex projectors, Peerless Magnarc lamps, and Bausch & Lomb lenses, certainly not a bad combination at all. Try as I may (and I certainly do not abuse either my equipment or the film, pulling only 62-64 amperes) I experience great difficulty in properly focusing CinemaScope prints.

RICHARD C. MAHONEY

Wethersfield, Conn.

COMMENT: Blurry CinemaScope is a common problem, not at all peculiar

est quality look reasonably clear on the screen, two factors sometimes spoil the focus. One is the obvious factor of "fuzzy" images on the film. The other is a cylindrical-lens anamorphic attachment which has not been correctly focused for the prevailing projection distance, or "throw." Most anamorphic lenses are provided with a focusing ring to change the distance between the cylindrical elements. A special Cinema-Scope target film, or in lieu of this a test film having high photographic resolution, should be used for focusing anamorphic lenses.

You need not worry about excessive film flutter at 62—64 amperes. If your CinemaScope presentations are clear when the releases of other companies are shown, it would almost seem that your Fox prints are at fault. But this is a conclusion we are not prepared to state without having film clips to examine under a microscope.

Cam-pin Figures Sipper-block 2 3

FIG. 1. The pull-down cycle of the Radion II, showing the offset driving shafts, as described in correspondent Ruiz's article of January, 1957.

Nemec on Film Standards

Boyce Nemec, the New York management consultant, maintained that world-wide marketing, progress and profits, and actual survival of the motion-picture industry depend on standards at the recent Eighth National Conference on

Standards in San Francisco. The conference was held in conjunction with the 39th annual meeting of the American Standards Association, which was host to several hundred engineers, business executives, and government officials attending the three-day meeting.

All standards developed and used by the industry go through the American Standards Association, said Nemec, and such standardization makes it possible for a motion picture photographed in this country, on film made in one section and printed on release stock made in another, to be projected anywhere in the

But Nemec also considered the fluidity of standardization: "Engineers who do the film industry's standardization consider it most appropriate that the procedures of the ASA provide for the revision of standards as necessary. This is one industry that takes full advantage of that opportunity."

Help for Drive-Ins

Two new aids for drive-in presentation should be coming along soon: brighter prints and stereophonic sound.

Harold Hecht, president of Hecht-Hill-Lancaster, has announced that his company is buying an extra 100 "specially processed" prints for drive-in use. These prints will be "brightened" to give as good a picture as possible on the large screens, the new policy starting with the forthcoming "Run Silent, Run Deep."

Estimating the number of drive-ins in this country at about 4,500, Hecht stated that the additional cost of the prints would be worth it "if we can help sustain the tremendous audiences attending these outdoor theatres."

Also from the West Coast is news of stereophonic sound for the ozoners which heretofore have been limited to single-speaker sound distribution. Ampex Corp. has filed for patent a three-speaker system that will rest on the car's instrument panel and "bounce" the sound off the windshield. This is planned to give directional sound. No production plans have been released as yet.

Kodak AV Into Sales Dept.

Eastman Kodak's non-theatrical films division and informational films division have become part of its sales service division. The non-theatrical films division disseminates information concerning the application of Kodak products in the making of motion pictures by industry, the government, churches, and other organizations. The informational films division produces motion pictures in connection with the company's informational program.



Your SIMPLEX Projector Mechanism represents a priceless investment. You bought it after long, careful study because you recognized it as the finest projector on the market.

Don't take chances with such an investment — the very success of your theatre depends upon its performance! When spare parts are necessary, insist on the best — insist on SIMPLEX parts!

From gears to sprockets, every part is made with the same precision and skill as the mechanism itself. By using only SIMPLEX parts, you can be certain of maintaining the high quality of performance that has made SIMPLEX the world's foremost projector mechanism!,

Genuine SIMPLEX parts are available only through



Your Guatantee of Consistent Quality and Outstanding Service

NATIONAL THEATRE SUPPLY COMPANY - BRANCHES COAST TO COAST

Westrex Hi-Power Units for Drive-Ins

THE WESTREX CORPORATION is introducing a new series of high power transmission units for its drive-in theatre systems and as replacement units in existing installations where greater undistorted power is wanted.

These transmission units are supplied in sizes as required from 400 continuous watts for drive-in theatres with up to 800-car capacity, to 1200 watts for a 2400-car drive-in.

Modern simplicity of design has resulted in a compact unit and a reduction in installation time and expense. Easy accessibility to all components simplifies servicing.

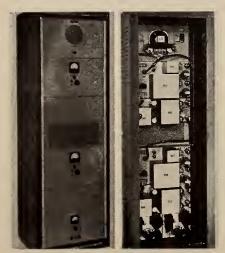
The accompanying illustration shows the 400-watt transmission equipment unit for drive-in theatres with a capacity of up to 800 cars. Two of the new Westrex 28-type 200-watt amplifiers, each with independent power supply, regular and emergency exciter lamp rectifiers and an emergency switching and monitor horn panel, are combined in a single 5-foot 6-inch cabinet.

The Westrex 28-type main amplifier has a continuous power output rating of 200 watts with a harmonic distortion of less than one per cent over a frequency range of from 20 to 20,000 cycles and a peak power rating of 400 watts with not more than one per cent harmonic distortion.

Frequency Response

The frequency response of this amplifier is flat within ½ db over the entire operating range. The amplifier has an adequate gain to work directly from the fader into the ramp distribution panel as it will deliver 400 watts output power with an input level of -20 dbm.

The output damping factor of the push-pull triode output has a minimum



Westrex 400-watt transmission unit for driveins. Open rear view of this unit may be seen on right.

ratio of greater than 12 to 1 with the result that the impedance of the in-car speaker circuits is not critical. A meter is provided on each amplifier for output tube monitoring.

The output voltage of 57.5, 70.7 (normal), 115 or 141.4 volts may be selected. Low impedance outputs of 4, 8 and 16 ohms unbalanced to ground can also be supplied. The 28-type amplifier can be operated from either 50 or 60 cycle sources of power.

Although two 28-type amplifiers are

normally employed in this 400-watt transmission unit, one amplifier can supply sufficient output power to operate 800 in-car speakers on an emergency basis. This feature eliminates the necessity of providing emergency standby power amplifiers.

The Westrex drive-in theatre transmission units are also available with continuous output ratings of 600, 800, 1000 and 1200 watts. This largest unit of 1200 watts has a peak output of approximately 2½ kilowatts. This amount of power capacity is contained in three small rack cabinets which occupy a floor space of less than eight square feet.

PERSONAL NOTES

A. A. Ward, executive vice-president and director of Altec Companies, Inc., is the new president of the firm. Ward has been with Altec since 1929, starting as an installation and servicing man for theatre sound equipment. Moving up through commercial engineering, special





A. A. Ward

C. S. Perkins

engineering and general manager of Altec Lansing, he became vice-president and director in 1943. When the parent company, Altec Companies, was organized in 1956, Ward was elected vice-president and director, and became executive vice-president last year

Following on the news of Ward's election was the announcement that C. S. Perkins had been chosen a vice-president of Altec Companies. Perkins was former general manager of Altec Service Co. Perkins also joined Altec in 1929, and served successively as Eastern division manager and national operating manager in the latter years. He will continue as chairman of the Altec Service Management Committee, a post he assumed in July, 1957.

EASTMAN KODAK has announced a number of new year appointments. CHARLES C. PARKS has been named assistant sales manager; RICHARD P. THATCHER photofinishing supervisor of the Southeastern sales division; WYLIE S. ROBSON is the new assistant director of sales administration; WILLIAM P. LANE has been approach to the same appro

pointed assistant general manager of the international division; FRANK R. ZIERER, assistant manager of Kodak Mexicana, Ltd., has been elected assistant manager for Kodak's affiliates in Latin America; and HUGH J. KNAPP has been promoted from assistant manager to manager of the export sales department.

WILLIAM H. METZGER has also been named a sales service supervisor for Professional Motion Picture Products of Ansco. A member of the Professional Motion Picture department for the past five years, Metzger, in his new position, will supervise sales and services of professional motion picture products in the Atlanta, Binghamton, Boston, Chicago, Detroit, Dallas, New York, and Toronto sales districts.

NATHANIEL M. MARSHALL has been appointed to the new post of associate director of sales of the Industrial Products division of General Precision Laboratory. Before joining GPL in 1950, Marshall was head of operations at the Navy Special Devices Center, where he produced and directed experimental educational TV programs. Since 1955, he has been national sales manager for GPL Industrial Products.

WILLIAM J. TURNBULL, former executive vice-president of National Theatre Supply Co., has been elected president of that organization. He succeeds Walter E. Green, who retired as head of the



Willard J. Turnbull

General Precision Equipment subsidiary. Turnbull joined the equipment distributing firm in 1933, and rose from branch manager to executive vice-president through many key posts.

* * *

John C. Maxwell, senior partner of Tucker, Anthony & R. L. Day, members of the New York Stock Exchange, has been elected to the board of General Precision Equipment Corp., it has been announced by Hermann G. Place, chairman of the board and president.

* * *

LOUIS H. PURCELL is the new Los Angeles district manager for Ansco. With that firm for 20 years, Purcell previously



Louis H. Purcell

has been manager of the Boston district. He will be responsible for all sales activities in lower California, Arizona, and parts of New Mexico and Utah.

James P. Davis and Walter W. Bullock have been named vice-presidents of RCA's record operations department and record albums department, respectively. Davis has been manager of the record operations department, and Bullock manager of the record albums department.

T. F. McCleary has been appointed manager of the Pittsburgh branch office of National Theatre Supply Co. The office serves the western Pennsylvania and northern West Virginia trade areas. Prior to joining NTS, McCleary was president of Alexander Theatre Supply, Inc., and has also had extensive experience in the theatre equipment and supply field with RCA for some twenty years.

CYRIL AINSWORTH, technical director of the American Standards Association, has been appointed deputy managing director of the association, as well as continuing as assistant secretary. He will be succeeded by J. W. McNair, former assistant technical director, for many years in charge of the electrical and photographic work of the association. Both men have been with the ASA 28

years, and were instrumental in reorganizing that body, watching it grow from a membership of 176 to over 1700. ASA is the national coordinating body and clearing house for voluntary engineering, industrial, and consumer standards. It is a federation of 116 of the nation's leading trade associations, technical societies, and public interest organizations, with 2300 company members.

MRS. OSCAR F. NEU has been elected president of Neumade Products Corp. to succeed her late husband, the founder and former president, Oscar F. Neu.

LEE E. JONES, currently chairman of the board of directors of TESMA, was elected to the position of executive vice-president, and HELENE E. JONES reelected to the office of secretary.

× * +

ERIC SHELDON will represent Technicolor Inc. as Eastern sales manager of its Consumer Photographic division, a newly-created position. Prior to joining Technicolor, Sheldon was sales manager at Kling Photo Corp. in New York, and previously was associated with O. W. Ray, photographic distributors.

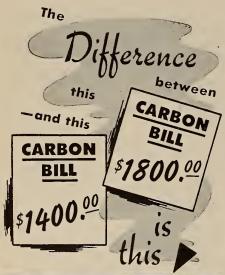




EARNINGS

(This department is devoted to nontechnical items that have a direct bearing on the welfare of the industry.)

RCA sales of services and products in the first nine months of 1957 reached a record \$853,667,000, exceeding by 5 per cent the previous mark established last year. Net earnings are \$28,320,000, which represents \$1.87 per share on common stock. . . . Eastman Kodak's gross was \$541,471,866 for the first three





CRON-O-MATIC FULLY AUTOMATIC CARBON SAVER

Uses positive carbon stubs of any length without preparation. When the stub is entirely consumed, the new carbon goes into use without affecting the lamp operation. Burning stubs of average length (3½") down to ¾", saves you 22.2% on your carbon bill, an average of \$400.00 a year. Designed for use with Ashcraft "D" or "E", Brenkert-Enarc, Peerless Magnarc, or Strong Mogul projection lamps. If your dealer can't supply you, order direct.

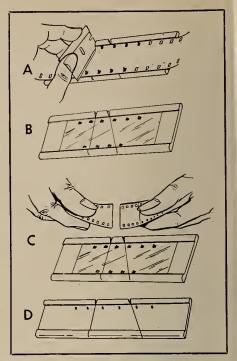
PAYNE PRODUCTS CO.
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CITY & STATE
Export: Frazer & Hansen, Ltd. San Francisco, New York, Los Angeles

quarters. net being \$65,655,957, an increase of 8 per cent over 1956, and equal to \$3.40 per share on common stock. . . . AB-PT's net operating profit, including net capital gains, was \$4,082,-000 for the nine-month period. . . . "Ten Commandments" has officially grossed to date: \$26,500,000 with more to come out of \$16,250,000 rentals; there have been 917 openings. . . . Allied Artists Pictures has garnered a net profit of \$90,800 for the first quarter of the fiscal year as against a loss of \$100,000 for the same period last year, with a gross of \$4,894,000. . . . Cinerama has now paid off in full its direct debt, and recouped \$10,600,000 for theatre and production costs. . . . Technicolor, Inc., has announced consolidated net earnings of \$591.850 for the nine-month period, or 29 cents per share on 2,033,904 shares of stock outstanding. . . . Paramount Pictures reports net earnings from operations for the first nine months as estimated at \$4,237,000, compared with \$3,976,000 in the same period last year, equal to \$2.13 per common share. . . . Eastman Kodak has voted a \$38,200,000 wage dividend to be shared by more than 50,000 employees, the highest dividend in the plan's 45-year history. . . . List Industries (RKO Theatres) has a gross income of \$3,809,830 for nine months of 1957, representing a take of \$900,000 more than last year.

New F & B Butt-Splicer

Florman & Babb, Inc., equipment dealers, have introduced a new device for butt-splicing 16- and 35-mm film. using Magic Mylar sprocketed transparent splicing tape.

Simple to operate, the butt-splicing blocks need only the application of a razor blade. The accompanying illustra-



Splicing procedure for the Florman & Babb buttsplicer: (A) film is registered on guide sprockets, and cut with an angled razor blade; (B) film is removed and Magic Mylar tape is laid in splices, sticky side up; (C) film is laid in over the transparent splicing tape, registered by guide sprockets, and the butt-splice is completed. The bottom illustration (D) is the 16-mm block with only one set of guide sprockets.

tion shows proper splicing procedure.

The blocks are available in four models—for 16-mm only, for 35-mm only, for ½-inch magnetic tape, and a combination block for all three. They are made of anodized aluminum, and are completely non-magnetic, so that magnetic tape and magna-striped film may be used safely.

BUY U. S. SAVINGS BONDS

KODAK PAVILION FOR BRUSSELS WORLD'S FAIR



Artist's conception of the new photographic information center which Kodak is constructing for the International Exhibition to be held in Brussels, Belgium, opening in April. The exhibit will be staffed with Kodak's international personnel, able to answer questions in many languages, and a great number of photographic products will be displayed. The glass facade will be 30 by 100 feet.

OBITUARIES

Massey, Bert, member of Toronto Local 173 for the past 45 years, died suddenly on November 27 last. He worked as a projectionist at the Imperial Theatre for about 22 years, and was a member of the Famous Players 25-Year Club and of the Canadian Pictures Pioneers.

Murphy, George, 72, member of Local 224, Washington, D. C., died last month at Mt. Alto Veterans Hospital. Prior to his retirement, about five years ago, he worked as projectionist at the Dumbarton and Tivoli Theatres in Washington.

COPPLE, JOHN B., 65, member of Local 253, Rochester, N. Y., died last month of a cerebral hemorrhage. He was last employed at the Lakeshore Drive-In Theatre. Copple transferred from Wheeling (W. Va.) Local 64 to the Rochester Local back in 1923.

NELSON, BROUKE, veteran member of To ronto Local 173, died suddenly on December 31st last. A member of the Local for the past 39 years, Nelson was highly regarded by the membership. He was a member of the Famous Players 25-Year Club.

SOCIAL SECURITY LAW

(Continued from page 13)

per cent for each month between the date of her retirement and her 65th birthday. (If she retires at 62, her benefit thus would be reduced by 20 per cent.)

(C) BENEFITS FOR DEPENDENTS OF A RETIRED WORKER

- 1. The wife of a retired worker, if she is 65, can get an old-age benefit equal to one-half the amount her husband receives.
- 2. The wife of a retired worker, if she is between the ages of 62 and 65, may receive a benefit. BUT it is also reduced by 0.69 per cent for each month between the date of her retirement and her 65th birthday. (If she retires at 62, her benefit would thus be reduced by 25 per cent.)
- 3. The wife of a retired worker, if she has worked herself, may be entitled to old-age benefits based on her own earnings. She may collect whichever benefit is highest.
 - 4. Among certain other dependents of

retired working men and women who may get benefits are: children under 18 (in some cases, after age 18, if disabled), dependent parents, dependent husband. The total amount of benefit that can be drawn by all dependents of one person is limited by law.

(D) HOW MUCH YOU MAY EARN AFTER YOU RETIRE

After you reach age 72 you can keep all of your monthly old-age benefits no matter how much you earn. BUT before you reach age 72, you can lose some of your monthly benefits, depending on how much you earn:

- 1. If you do not earn more than \$80 in any month of the year-you can keep all of your benefits.
- 2. If you earn over \$80 in some months of the year but your earnings for the year are not more than \$1,200-you can keep all of your benefits.
- 3. If your earnings for the year are more than \$1,200—you may lose one monthly benefit for every \$80 you earn in excess of the \$1,200.
- 4. BUT, no matter how much you earn in the year-you can keep your benefit check for any month in which you earned \$80 or less.
- 5. If a retired worker loses his monthly benefit because of his earnings his dependents lose their benefits for the same months. However, if a dependent or survivor exceeds the limits on earnings, only his or her benefit will be affected.
- 6. Anyone who works after retirement may have the amount of his benefit increased. After 65, there must be an individual request for the review of the benefit. BUT for women who retire before the age of 65, the review is automatic if they lose three or more monthly benefits before age 65 because of excess earnings, as described above.

[TO BE CONTINUED]

A PROPHESY COME TRUE

(Continued from page 9)

bid any video network or any advertiser. or any combination of the latter, for sporting and other special events. The hitch here, however, is twofold: how would the program be transmitted to the theatres? And how many such events are available to a theatre during the course

of a year? And how about the difference in time zones?

The utilization of TV by the motion picture theatre would mean simply a change in the present distribution system for film programs—through the ether instead of by cans of film transported by truck, express or plane. But this contingency need occasion no concern here. because the motion picture industry hasn't any transmission facilities, open or closed. And why bother about etherizing programs when the job can be done much better on film?

The point being made here is that while one branch of the industry is busily engaged in insuring its future economic health-possibly for a financial killing-the exhibition field as a whole is just drifting along and doing not a damned thing about a development which could easily encompass its destruction.

February, 1958, Well . . . ?

FILM REPAIR AND SPLICING BLOCK

REPAIRS DAMAGED FILMS



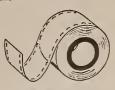
For 35mm and 16mm Film

Sprocketed Transparent Splicing Tape 19.95

Magic Mylar Sprocketed Transparent Splicing Tape repairs torn, gouged films as good as new . . . without the loss of a single frame. Applied directly on both sides of the damaged film, Magic Mylar (only 1/1000 of an inch thick) repairs, reinforces and holds the broken film together . . WITH THE STRENGTH OF MORE THAN 3 TIMES THE ORIGINAL FILM.

REPAIR TEARS REPLACE BROKEN SPROCKET HOLES REPLACE GOUGES STRENGTHEN LAP SPLICES MAKE BUTT SPLICES

MAGIC "MYLAR" TRANSPARENT SPROCKETED SPLICING TAPE



16mm-Single or double perf. 66 foot roll 35mm-66 foot roll

\$ 5.00 9.00

FLORMAN & BABB, INC.

6B W. 45th St., N. Y. • MU 2-2928 F & B carries a complete stock of motion

picture and audio-visual equipment.

- BRIGHTER LIGHT
- LONGER BURNING
- SHARPER PICTURE

Free Test Samples



- STEADIER LIGHT
- LESS ATTENTION
- PERFECT COLOR BALANCE

Free Carbon Chart

INSPECTING PRINTS

(Continued from page 8)

cross-marks, punched-out holes, or other mutilations. Many projectionists score faint cues only in the first and third of the four cued frames. It may be best, however, to score four successive frames when new cues have to be made, particularly if the film is to be subsequently used in other theatres.

Note that there are 11 feet of film (7.333 seconds of running time) between the first of the four motor-cue frames and the first of the four changeover frames. There are 22 frames (0.917 second) between the first frame of the changover cue and the beginning of the opaque runout trailer, which should be at least 3 feet in length.

If it be necessary to place curtain or other special cues on prints, do not score these cues in the emulsion, but use a china-marking pencil. (Black is preferred because the red smears in the presence of oil and defaces several frames.) Wipe the crayon cues off before returning the prints—they would be meaningless, and possibly confusing, to projectionists in other theatres.

For projection it is best to use a special set of reels maintained in first-class condition. The shipping reels

belonging to the film exchanges are often bent and "sprung," and may give trouble in the projectors. It is desirable, however, to let the film wind up on the shipping reels during the last showing because film winds up more evenly in the projectors than on an ordinary rewinder not equipped with a lateral film-guiding device. Unevenly wound rolls of film are easily injured by crushing when replaced in the shipping cases.

One 'For The Road'

A few "operators" (we won't call them projectionists!) take the astonishing attitude that, because the prints do not belong to them, there is no reason to treat film with the great care which IP has always advocated. All right, so the prints don't belong to us. But after we have finished with them, some other projectionist is going to get them for showing. It might be you, in reverse order.

It is out of consideration for the next fellow down the line, and for the moviegoing public whose shillings and quarters provide us with three square meals a day, that we treat all film with the greatest care.

ROBERT A. MITCHELL'S

MANUAL OF

PRACTICAL PROJECTION

STRONG'S BLOWN-ARC

(Continued from page 17)

ing the position of the burner.

Lamp house and reflector are completely air conditioned. Aperture heat generated by the projection beam is asserted to be no greater than when burning an 8-mm copper-coated trim at 70 amperes without a heat filter. Soot and smoke are withdrawn by a 100 CFM suction blower which changes the air in the lamp house every 6 seconds. Coolness of the lamp in operation is a function of its size, and the fact that direct radiation from the arc to the lamp house is minimized because of the arc being almost completely surrounded by reflectors.

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The auxiliary mirror, positive and negative carbon heads are water-cooled.

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In addition to the regular manual negative feed, which can be used for striking the arc, there is a separate manual control which requires one motion to give quicker and more positive striking, at the same time automatically positioning the arc for the proper gap length of ½ inch.

Rectifiers can be located at any distance from the projection lamp, and the power adjusted by changing a control mounted on the instrument panel of the lamp. A new 220-volt, 3-phase selenium rectifier, designed by Strong especially for operation with the blown arc, has a saturable reactortype transformer which makes this possible. This is designed to eliminate temperature built up in the projection room by rectifier heat.

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Overall dimensions of the lamp are 45 inches long x 29 inches wide and 43 inches high.

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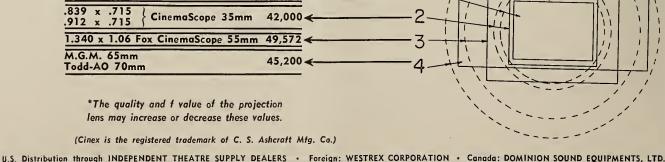
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International PROJECTIONIST



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Monthly Chat

Toll-TV? Why Not?

THE EMINENT David Sarnoff, board chairman of RCA, stated flatly before a Congressional committee that toll-TV would kill what he described as "free" TV. With this statement we agree absolutely, desiring only to add that in our view it would also kill toll-TV.

It is for precisely this reason that IP, probably alone within the ranks of those on our side of the fence—the talent and craft guilds, and certainly the unions—is a rabid enthusiast in behalf of toll-TV. Anybody watching a feature movie on "free" TV these days must necessarily be nauseated by the presentation technique; and if toll-TV were introduced the requisite of a charge against the subscriber would inevitably and quickly chase people right out of their homes in quest of other entertainment, most likely the motion picture theatre.

Apropos these notions, there is appended hereto a recent commentary by the radio-TV critic for the Scripps Howard newspapers, Miss Harriet Van Horne, widely known and highly esteemed for her penetrating critiques. Under the apt heading, "What if TV Had To Roll Its Own?" Miss Van Horne wrote:

As one who roams the channels after dark, searching for buried treasure, I was pleased to read that the major film companies have declined to release their post-1948 productions to television. I say, hully for the film companies!

I only wish they'd made this decision a long time ago, and set the date at 1938. If television did not have this cheap and easy access to old movies it might, of necessity, apply some ingenuity to developing live, inexpensive programs to fill the late hours.

In consequence of this, the public might even develop a taste for plain, honest sessions of talk or music or instruction. I firmly believe that there must be millions of people who would prefer a lively lecture on bee-keeping (or old armor or the habits of earthworms) to another showing of "Andy Hardy Meets a Debutante."

When I see a movie, I like to see it in a movie house, dark, hushed and insulated from reality.

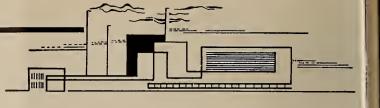
When I watch television I like to watch live, hreathing people. They can sit around on hoxes and discuss life, art, rock 'n' roll or the weather. They can play the piano or do magic tricks. My point is that such programs could be produced for a few hundred dollars. And oh, what a noble service they would be rendering!

I have another grievance against movies on television. You can't get involved with the characters and their conflicts. There are many reasons for this. The size of the home screen, the countless interruptions for commercials, the ringing of the telephone (yours and mine), the impulse to tidy the living room during the dull spots, and the fact that you are watching in your own husy, familiar home. Rarely does a TV film take you out of yourself and into its own special world.

Rarely, after watching a movie on television, does the viewer long to discuss it with others. It's out of sight and out of mind, just like that.

So complete is one's absorption in a theatre, however, that it's sometimes a jolt to find that the picture is over—and it's out into the streets again, with real life giving us a mean stare.

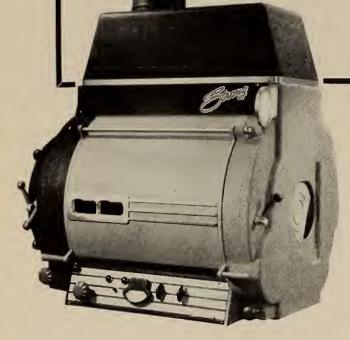
A witty Englishman named Paul Jennings has suggested that the cinema makers ought to take advantage of the happy, dream state induced by two or three hours before the giant screens. Every movie house exit, he says, ought to lead to a rehabilitation (Continued on page 26) OUT OF THE LABORATORIES. PEOPLED BY THE WORLD'S GREATEST PROJECTION LIGHTING ENGINEERS



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light source, the available pickup angle is increased to more than 260°. Since the conventional reflector pickup angle is only 160°, an auxiliary 4-inch spherical reflector is located behind the positive carbon to utilize this increased availability of light. This auxiliary reflecRelative position of carbons as rear lamphouse door is opened slightly.

tor picks up light from the arc and reimages it to the main mirror to be combined with the light from the crater. Total lumens are thus increased 12-15%.

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Loudspeaker Characteristics and Sound Quality

By ROBERT A. MITCHELL

of the screen—a "voice" that must successfully mimic all other voices, speak with the eloquence of every musical instrument, thunder with the deafening roar of a train, and whisper as gently as a half-heard summer breeze. The theatre loudspeaker must be capable of reproducing in a natural manner the extensive sound spectrum included between 50 or 60 cycles and 8,000 or 10,000 cycles. If the speaker is inadequate to its exacting task, the illusion created by the projected pictures is largely lost.

To use scientific terminology, a loudspeaker may be described as an electro-mechanical "transducer" of sound energy supplied in the form of alternating electric currents. And it is the *mechanical* aspect of a speaker that warrants special attention. The function of a speaker, like that of a motor, is to transform electrical energy into mechanical energy.

Speaker Quality

The sound-system amplifier (an allelectronic device) supplies a tremendously amplified "signal" which is a practically perfect electrical replica of the weak sound signal generated in the soundhead. When the speakers behind the screen mechanically transform the fluctuating sound currents into the varying air pressures of audible sound, however, the complex waveforms of the signal may undergo alterations and emerge as distorted sound. Because distortion, particularly if minor and persistent, is usually created by the loudspeakers and their associated baffles and horns, the quality of the speakers used in a theatre very often means the difference between good sound and bad sound.

It isn't hard to understand the terrific stress and strain under which loudspeakers operate. The metal or paper diaphragm is required to move in and out like a piston as rapidly as 10,000 times each second for the highest treble tone and as slowly as 50 times each second for the lowest bass tone. When reproducing several bass and treble tones simultaneously, complex amplitude combinations often demand nearly instantaneous changes of diaphragm position.

No actual diaphragm can follow in-

Fascinating indeed to both the technical and lay minded is the functioning of the modern loudspeaker; and here is one of the most comprehensive and lucid expositions thereof we have been privileged to present.

stantaneous changes in the sound signal. A speaker diaphragm, like any other object having an appreciable mass (weight) possesses *inertia*, or resistance to movement. At its worst, the inertia of a diaphragm distorts and weakens the higher sound frequencies and creates false sum-and-difference frequencies. The latter effect is called "intermodulation;" and because the spurious frequencies may bear no harmonic relationship to the frequencies which generate them, intermodulation sounds very bad.

When functioning at its most efficient best, a speaker diaphragm often experiences mechanical stresses 10 times more severe than those undergone by an aircraft coming out of a high-speed dive!

Common Acoustic Deficiencies

The mass of a speaker diaphragm also introduces resonance, another serious mechanical defect. Any material body has a certain natural frequency at which it vibrates most readily; and speaker diaphragms are no exception. Resonance causes some frequencies to be overamplified and others to be weakened or suppressed. A "peaky" response results in nonlinear, or frequency, distortion, and is pro-

duced not only by the diaphragm of a loudspeaker but also by the resonance characteristics of associated horns, baffles, and bass-reflex cabinets.

Resonance in the range of audible frequencies adds to the reproduced sound a false quality which may be variously described as "hollow," "boomy," "wooden," "metallic," "harsh," etc. It is at a minimum in speakers having the flattest "response curves" (Fig. 1).

It is important to bear in mind that the amount of distortion produced by a loudspeaker bears no relationship whatever to its acoustic efficiency, or ability to transform sound current into sound waves. Some of the horn-

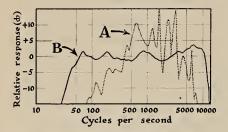


FIG. 1. The frequency-response characteristics of two theatre loudspeaker systems. A is the response curve of an early "restricted-range" speaker having an excessively "peaky" response. B shows the relatively level response to be expected of a modern high-fidelity speaker installation.

type speakers used in the early days of sound pictures had an extremely high efficiency, but nevertheless produced sound so distorted that it would be unacceptable today.

And the smaller and less efficient "dynamic" cone-type speakers employed in good radios and home "hi-fi" equipment possess a more uniform frequency response with less acoustic intermodulation and harmonic distortion than many high-efficiency speakers used in expensive theatre sound systems.

It is much more difficult to obtain truly high-fidelity sound reproduction with large theatre sound systems than with small, and relatively inefficient, home units. Accordingly, theatre sound systems of the highest quality are necessarily many times more expensive than small, simple units capable of equally good sound reproduction in the home.

Evolution of the Loudspeaker

The evolution of the modern loudspeaker from the crude metal-diaphragm, fixed-coil telephone receiver

is easily traced. The basic principle of Alexander Graham Bell's primitive receiver of 1876 is utilized even in the most modern speakers for high-fidelity reproduction. The fluctuating magnetic field produced by sound currents in a "Voice coil" interacts with a magnetic field of constant strength to cause an iron diaphragm to vibrate in step with the sound-current variations and thus generate sound waves in the air. Every commercial speaker except the condenser and crystal types (neither of which is much used in the theatre) operates on this electromagnetic principle.

The first loudspeaker was the simple telephone, or headphone, receiver fitted with a megaphone-type horn to reinforce the sound waves. Even though this crude loudspeaker did much to popularize commercial radio broadcasts (which previously could be heard only through earphones), its limited frequency range and "peaky," distorted response instigated the development of better speakers for more natural sound reproduction.

The weakly squawking horn of the early 1920's was soon displaced by cone-type speakers, often ridiculously large for their low power, driven via mechanical "armatures"; and these were superseded in the middle 20's by metal-diaphragm and paper-cone dynamic speakers of the type used today.

Dynamic Speakers the Standard

Dynamic speakers are distinguished by their use of *moving* voice coils attached directly to the diaphragm. The voice coil was formerly wound around the legs of the field magnet, and hence remained in a fixed position. This construction wasted a large part of the sound power in a magnetic "short circuit"; and the vibrating iron diaphragm was only weakly impelled by the varying magnetic field. Dynamic speakers are much more efficient.

In the metal-diaphragm dynamic speaker, still used for main-range and high-frequency reproduction, the voice coil is wound near the edge of a cupshaped metal diaphragm free to move in and out in the manner of a piston (Fig. 2). Before the use of "woofer" (low-frequency) and "tweeter" (high-frequency) combinations, this type of speaker was often used alone (e.g., the old Western Electric 555 receiver attached to a large exponential horn). Sound reproduction by such a speaker is noticeably deficient in the lower

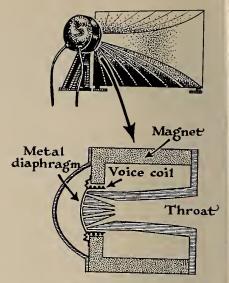


FIG. 2. A modern metal-diaphragm "receiver." When attached to a trumpet-shaped exponential horn, this receiver forms the high-frequency unit of a modern speaker system.

frequencies, hence sounds "thin" and "tinny."

All metal-diaphragm dynamic speakers consist of a "receiver unit" and a horn of special design. The horn is necessary to "load" the small vibrating diaphragm so that the acoustic power is effectively transferred to the air, and thence to the ears of the audience. The size of the horn determines the lowest frequency which the unit can reproduce, and the shape and rigidity of the horn have an important bearing on the quality—the naturalness—of the sound.

Both old-style and modern metaldiaphragm speaker horns flare out

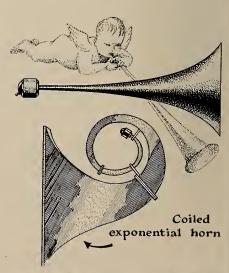


FIG. 3. Whether straight or coiled, the size of an exponential horn at any point along its length is mathematically related to the distance from that point to the small end. The exponential horn makes the metal-diaphragm dynamic speaker the most efficient type of loudspeaker.

gradually from the receiver end to the mouth in conformity to an exponential formula which relates the diameter of the horn at any point to the distance between that point and the small end (Fig. 3).

The exponential horns used with modern "tweeter" (HF) units are ordinarily constructed in the form of several small horns placed closely together to insure a distribution of high-frequency sound corresponding to the wide diffusion characteristics of the "woofer" (LF) unit.

Cone-Type Dynamic Speakers

Dynamic speakers having papercone-diaphragms are used for reproducing the entire sound spectrum in small sound systems (phonographs and radio and television sets), and for low-frequency reproduction in the larger systems employed for theatre sound (Fig. 4).

The voice coil of this type of speaker consists of a small coil of fine copper wire or aluminum ribbon wound upon a cylindrical tube made of a light, but rigid and warp-proof, material. This tube is mounted in a circular air-gap in the field of a strong magnet, and is centered by a "spider" of corrugated, springy metal or plastic. The voice coil is thus free to vibrate in and out like a piston in step with the fluctuations of the audio current flowing through its windings.

To transform the vibratory movements of the voice-coil assembly into pressure waves of audible sound, a paper cone held at its outer rim by a corrugated or flexible leather border is firmly attached at its center to the voice-coil tube. All movements of the voice coil are thus transferred to the paper cone.

Electromagnetic and PM Units

The strong magnetic field against which the varying field of the voice coil operates was formerly supplied by a large electromagnet energized by an external source of steady direct current. With the discovery of alnico and similar magnetic alloys, the oldstyle field electromagnets have been replaced by more compact permanent magnets ("PM" speakers) which provide a constant magnetic field of considerable strength without the need of DC "field current."

Modern speakers, therefore, have only two terminals—the voice-coil ter-

minals—whereas older speakers have four, two for the voice coil and two for the field. The polarity of both the voice-coil and field connections are equally important when more than one speaker is used in an installation. Complete directions for phasing loudspeakers are given in IP's "Manual of Practical Projection" (Chapter 27).

PM speakers not only do away with the need for a source of smooth DC to energize the field magnets, hut they also eliminate the hum created by field DC which has not been adequately "filtered" by large choke coils and capacitors.

Some of the older sound equipments utilized the amplifier "power-pack" rectifier for the field supply, while others employed small motor-generator sets or separate rectifier units. Several of the earliest sound systems employed emergency switches which enabled the projectionist to power the speaker fields from the arclamp generator in case of rectifier breakdown! And to eliminate the need for separate choke coils, the fields of the projection-room monitor and stage speakers were connected in parallel!

The quality, weight, and stiffness of the paper cone of a dynamic speaker

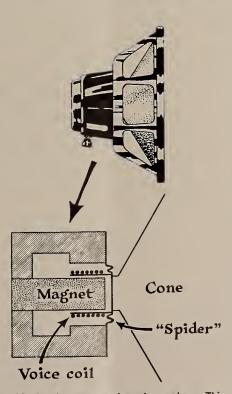


FIG. 4. A cone-type dynamic speaker. This type of speaker, employed only for low-frequency sound reproduction when large in diameter, must be used in conjunction with a baffle-board, bass-reflex cabinet, or folded horn to provide "acoustic loading" for the efficient transfer of sound energy to the air.

is extremely important to the fidelity of sound reproduction. Soft, porous, coarse-fiher paper is sometimes used for low-frequency speakers in 2-way systems employing woofer-tweeter combinations to eliminate the need for an efficient, and hence expensive, crossover-network unit. The soft paper absorbs and muffles the higher frequencies, thereby reproducing only the lower tones even though the voice coil receives the entire range of frequencies. Only a high-pass capacitor is needed as a "network" to cut off the lower tones from the HF tweeter unit.

"Soft" Cones for LF Units

Soft-cone speakers are not entirely satisfactory, however. They literally get rattled by the higher frequencies they absorb and dissipate, and consequently produce unpleasant intermodulation effects which the public immediately recognizes as distortion. Moreover, soft cones exhibit a strong tendency to "cry out" harshly at some frequency not related to the applied frequency. This phenomenon, although confined to the 1000—3000 cycle range, nullifies the performance of a high-fidelity amplifier and gives the impression of poor sound.

Any speaker which is overloaded reproduces the signal with a great deal of distortion. The voice coil with its flexible centering spider moves in and out so violently that it strikes against the field-magnet assembly and "blasts" or is restrained by the rigidity of the cone to so great an extent at the limits of its excursions that severe nonlinear distortion results. Resonance and intermodulation add to the distortion. Overloading is common in theatres having powerful amplifiers and inadequate speaker units.

The undesirable phenomenon of cone resonance, mentioned previously, can be minimized in three ways. The cone may be made oval in shape instead of circular. This has the bad effect of raising the natural frequency of resonance, but it reduces the tendency to resonate. The cone may be made very large to lower the resonant frequency below the audible range, but this expedient introduces distortion and high-frequency attenuation in speakers intended to reproduce the entire range of sound frequencies. Third, the corrugations at the periphery of the cone may be made sufficiently irregular to damp resonance.

Cones made of hard paper have the advantage of comparative freedom from "cry," but resonance poses a greater problem. Because hard-paper cones are more efficient reproducers of the higher frequencies than are soft-paper cones, effective crossover networks are necessary to block the treble tones from large hard-cone "woofers."

Hard-Cone "Woofers" Superior

Small hard-paper dynamic speakers give fairly uniform response over the 50- to 10,000-cycle range with only slight attenuation of the lowest and highest frequencies. For this reason, 4-, 5-, and 6-inch cone speakers may be used for the entire audible range in home radios and phonographs. In fact, hi-fi apparatus designed for the small living room does not require the tweeter-and-woofer speaker combination so necessary to natural sound in theatre sound systems.

Why, it may be asked, cannot the larger hard-cone dynamic speakers handle the main range of audible sound frequencies satisfactorily? When the speaker cone has a diameter of 10 or 12 inches, several bad effects usually make themselves evident when the higher frequencies are reproduced.

The greater mass of a large-diameter cone prevents the entire cone from vibrating in a truly piston-like manner when impelled by the higher frequencies. Only the middle area vibrates; and since the oscillations in such a case may depart from an axial direction and bend the diphragm from side to side, harmonic distortion may be produced. Then, too, the inertia of a large cone damps the highest frequencies; and when these are strengthened by overamplification, nonlinear speaker response and other distortions produce that well-known boxoffice poison-bad sound.

The Doppler Effect

The third, and most interesting, fault of a large cone energized by the entire frequency range is the "Doppler effect." An understanding of this effect and its incurable nature requires preliminary explanation.

If you stand near a railroad track as a train rushes by at high speed, and the whistle is being blown, you will notice a peculiar sound phenomenon. The pitch of the whistle drops

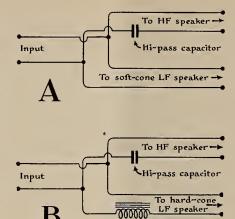


FIG. 5. Elementary "crossover" networks for separating the low- and high-frequency components of sound signals. The simple high-pass circuit shown in A requires a low-frequency speaker which fails to respond to the higher sound frequencies. The better sound systems, however, employ the type of circuit shown in B. The low-pass reactance coil prevents the high frequencies from reaching the low-frequency speaker.

Lo-pass inductance

at the moment the train passes by, and sounds lower as the train recedes into the distance. The speed of the train is added to the velocity of the sound waves when the train approaches, increasing the number of vibrations per second received at the ear. To a stationary listener, the pitch of the whistle sounds higher than it really is. Conversely, after the train has passed by, the speed of the train is subtracted from the velocity of the sound as the train recedes, decreasing the number of vibrations per second received by the ear. In this case, the pitch of the whistle sounds lower than normal. This is the Doppler effect.

Now consider the case of a sound

source that oscillates back and forth with great rapidity, alternately approaching and receding. The sound emitted by the source would seem to warble in the manner of an organ pipe played with the tremulator turned on. This is exactly what happens when a large speaker cone of great excursion range sounds a treble and a bass tone simultaneously. The source of the high-frequency tone—the speaker diaphragm-moves toward and away from the listener with a periodicity equal to the frequency of the low tone. The treble tone "gargles," and the sound seems "raspy."

The Doppler effect is minimized by using a battery of several smaller speakers in place of one large speaker, and it is eliminated by using a 2-way speaker system consisting of a bass-reproducing woofer and a treble-reproducing tweeter. The treble tones are then reproduced independently of the bass tones.

Crossover-Network Circuits

The success of a 2-way speaker system depends heavily upon the efficiency of the crossover-network filter circuits which allow *only* the bass frequencies to activate the LF units and *only* the treble frequencies to energize the HF units.

Elementary filter circuits are shown in Fig. 5. The "crossover" frequency range for the simple capacitor circuit (requiring a soft-cone woofer which loses radiating power above 4000—5000 cycles) is 3000—5000 cycles. Because the HF unit does not receive a signal lower than about 4000 cycles,

(Continued on page 24)

New Negative Coating Step Improves Motion Pictures

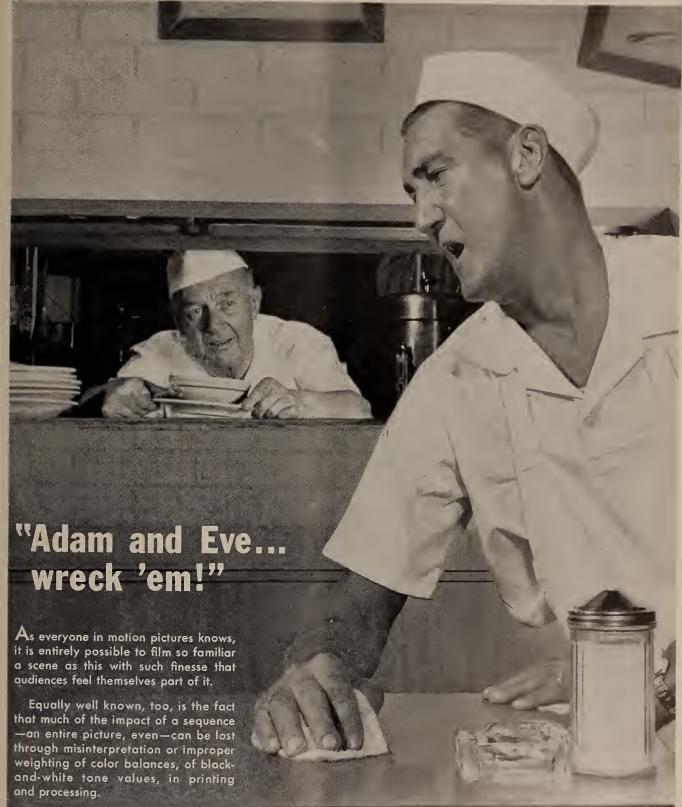
A method of obtaining better contact prints in motion picture film processing has been developed by Charles E. Osborne of Kodak Research Laboratories. His technique involves application of finely dispersed printer's non-offset solution to the negative. The new treatment prevents formation of Newton's rings when the smooth surfaces of negative and positive film come into close contact.

Newton's rings occur in motion picture film printing from the interference or reinforcement of wavelengths of light, due to the extremely thin layer of air trapped between the two smooth film surfaces. The phenomena are similar to the colored rings seen on an oil slick or soap bubble.

If rings occur when the film is being printed, they will be recorded on the print, Osborne states. If they appear in the same place on each frame, a definite Newton ring pattern will be seen on the movie screen when the final films are shown. Rings in different positions on successive frames cause a mottled effect.

Osborne points out that when a smooth-surfaced print film is to be exposed, application of the non-offset solution covers the negative surface with a series of fine random particles. These prevent the close contact that causes the rings, but do not interfere with the definition of the print. In research with Kodak test negatives the rough, preventive surface lasted well through 100 contact printings.

Eastman Kodak does not plan to manufacture a device for application of the non-offset solution.



To help the industry preserve highest standards, representatives of the Eastman Technical Service for Motion Picture Film maintain constant contact . . . provide motion picture film for every purpose. Offices at strategic points. Inquiries invited.

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East Coast Division 342 Madison Ave. New York 17, N.Y. Midwest Division 130 E. Randolph Drive Chicago 1, Illinois West Coast Division 6706 Santa Monica Blvd. Hollywood 38, Calif.



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- Engineered and manufactured by arc lamp specialists specifically for dependable, efficient use with angle or coaxial trim high intensity projection lamps.
- Full size selenium stacks . . . damp-proofed to withstand wet climates and winter storage.
- Type H (glass) insulated transformers. Withstand 150° F.
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- · Heavy duty fan.
- Line control relay.

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Please send literature on Strong Rectifiers.

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THEATRE	
CITY & STATE	
NAME OF SUPPLIER	

In furtherance of its producer-exhibitor technical liaison activity, the Motion Picture Research Council has already surveyed more than 400 theatres, indoor and drive-in, in the Western U. S. Significant excerpts from a report thereon are appended.

Basic Projection Problems Are Uncovered by Research Council Survey

N CARRYING forward the producerexhibitor technical liaison activity of the motion Picture Research Council more than 400 theatres in the states of Louisiana, Texas, Arizona, New Mexico, California, Oregon and Washington have been visited by the Research Council theatre contact staff.

The primary purpose of this activity is to promote renewed attention to the importance of technical excellence in presenting our product in the theatre. This is accomplished by discussion of problems with theatre management and technical personnel, offering suggestions toward improved projection based on the knowledge and experience of our theatre staff, Council staff and studio technicians. This type of direct personal contact can be effective and fruitful.

A secondary purpose is to collect data on theatre operations which may be useful in production.

Survey Modus Operandi

First, executives in charge of theatre operations for all groups of theatres in the area are called on. A general letter of introduction requesting their various theatre managers to extend cooperation is obtained, together with a list of the theatres to be visited, opening times, names of personnel, etc.

Union officials in the area are then visited and their cooperation has been very helpful. Whenever possible, union meetings are attended for short talks and technical question and answer sessions. For example, in the San Francisco area a talk was given before a district meeting of projectionist representatives and union officials from Arizona, Nevada and California. Projectionists have shown themselves to be keenly interested in any technical information that will help them do a better job.

At each theatre visited a loose leaf folio of Research Council Information Bulletins is left in the projection room. These theatres are placed on a mailing list and as the usefulness of new bulletins is indicated, they will be sent to each theatre thus maintaining a continuing

avenue of cooperation for the improvement of presentation standards.

After theatres throughout the area have been visited, a return call is made on executive management for the purpose of reporting findings and making recommendations.

Some of the more common problems encountered by our field men and recommendations toward their solutions follow:

Picture Sharpness

One of the most important factors is sharp focus over the entire screen area. Shorter focal length lenses and greater magnification factors have made focusing more critical. As a result, in many theatres less than optimum sharpness has been accepted as the best obtainable. There are several factors that affect sharp focus.

Projectors are inspected for worn film plates, inaccurate alignment or excessive vertical or horizontal play in the lens mount and excessive vibration of the projector itself. Where such faults exist, suggestions are made as to proper correction.

Heat on film, particularly black-and-white, causes buckling and detracts from optimum sharpness in proportion to the amount of heat and the focal length of the lens. Where severe buckling exists, methods of reducing the heat on the film are suggested—particularly pointing out methods presently available to reduce heat. Heat filters, air-cooled film, water-cooled apertures and curved gates have been useful in reducing this effect.

Lens Focal Drift

Caused by infrared heat on the lens elements is a widespread problem which necessitates frequent adjustment of focusing position during projection of each reel. This occurs particularly with color prints and again is proportionate to the amount of infrared heat, focal length of the lens and apparently increases with increased diameter of lens elements. Where this problem exists, it is recommended that the cold focus position of

the lens be marked on the focusing knob so that when the machine is started up cold on the changeover the reel will start in focus. It is then necessary to recheck focus several times during the projection of each reel.

This offers an immediate improvement, but better and permanent solutions to prevent infrared heat from reaching the lens elements are needed. Dichroic "heat-passing" mirrors accomplish this quite well. These mirrors are not available for all type lamps, however, and their cost is comparatively high. Too, they have had technical problems which have in many installations caused excessively rapid deterioration.

The Council is experimenting with what promises to be a more effective approach to this problem. This is a filter combining dichroic coating with a water cell which is designed to stop the entire range of infrared. Insertion loss is calculated as no more than that of the dichroic mirror.

CinemaScope Presentations

Another important factor in picture sharpness has been found to be common in the presentation of CinemaScope product. In many cases the distance ring settings of anamorphic attachments have been found to be improperly marked or improperly set. It has been emphasized that accurate focus can only be obtained in adjusting both vertical and horizontal focus by use of a projected target film such as the R.C. projector alignment film.

In cases where time permits, corrections such as these are made on the spot. "Film loops" of the R. C. projector alignment film are left with each projectionist so that he can check the distance ring setting later—if time is not available—and use this loop to periodically check focus

Other factors such as quality and condition of lens. port glass and picture unsteadiness affect optimum focus sharpness. Defective lenses and poor quality port glass are called to the attention of management. Where the picture is un-

Center Screen Brightness Indoor Theatres Wide Screen

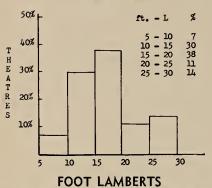
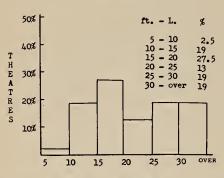


FIG 1A. First run — cities over 50,000 population.



FOOT LAMBERTS

FIG. 1B. First run — cities under 50,000 population.

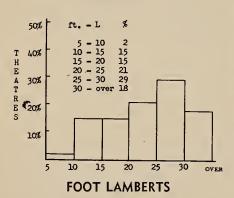


FIG. 1C. Subsequent run.

steady, one or more of the obvious causes are called to the attention of the projectionist. These include improperly adjusted or crooked guide rollers, alignment of film path, insufficient film gate tension, worn sprockets or worn intermittent movement.

The use of directional screens, often with an excessively high gain, results in badly unbalanced light distribution across the screen. Many such screen installations are improperly curved or not curved at all. In talking to management, the importance of these considerations is emphasized and they are given copies of the Council's recommendations

for proper curvature for this type of screen.

In many cases, the center screen brightness is excessively high, causing flicker. (In most cases this cannot be noticed by the projectionist due to his angle of view.) Adjustment of crater-to-mirror working distance or lower amperage is recommended. If lower amperage results in too much loss of side-screen or overall brightness (assuming there is no vignetting in the optical system) the lamphouse is badly aligned or inadequate for screen width and this is reported to management.

In cases of poor light distribution, it is recommended that adjustment and alignment of the light source and optical system be checked with the proper tools. These tools can usually be borrowed from local supply dealers.

Lens and Apertures

In many theatres both Wide Screen and CinemaScope are not shown to their best advantage due to excessive cropping. In some cases the theatre has a lens with a focal length too short for the throw. As a result an undersized aperture is used and the picture cropped excessively. In these cases it is recommended that a lens of the proper focal length be obtained and the aperture opened to the proper dimension. This not only reduces cropping but improves focus due to the longer focal length lens.

Most theatres project the same picture height for all types of product. Unless those theatres have variable masking, CinemaScope is cropped excessively in width and Wide Screen is cropped excessively in height. In many of these theatres not having variable masking, particularly subsequent run houses, the side masking does not cover the bare screen when wide-screen prints are shown. As a consequence, lint or dirt that may collect in the aperture and the outline of unevenly filed aperture plates show on the screen. The recommended solution is to install variable masking.

Faulty Aperture Practice

In theatres where otherwise proper masking is installed it is sometimes found to be improperly adjusted, allowing the edge of the aperture to show on the screen or allowing too much of the projected picture to spill over onto the masking.

In many cases apertures have been found to be filed off the correct center lines, resulting in unbalanced cropping which alters photographic composition, being particularly objectionable on main titles. Where this condition combines with the use of under-size apertures, significant picture information may often be cropped. The Council's projector

Center Screen Brightness Indoor Theatres CinemaScope

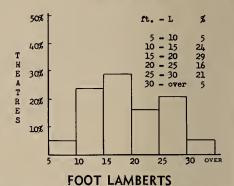


FIG. 2A. First run — cities over 50,000 population.

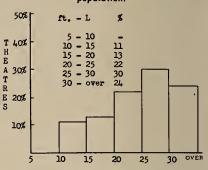


FIG. 2B. First run — cities under 50,000 population.

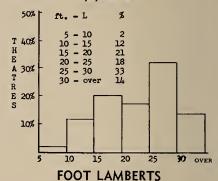


FIG. 2C. Subsequent run.

alignment film facilitates correction of these conditions.

Almost all projectionists requested an improved means of print identification. It would be helpful if the leader of each reel carried information such as picture name, reel number, type print (regular or anamorphic), type sound, and preferred aspect ratio. It should be considered that this information must be read in the low, ambient light conditions of a projection room.

Sound Reproduction

Consideration of sound quality and sound equipment were not made a primary part of this program, as most theatres have routine sound system checks (Continued on page 23)

Now the New NATIONAL VENTARC **Establishes New High Standards** of Screen Illumination . brings big screens



out of the dark

The edge light of the arc is reflected by the auxiliary mirror to the main mirror, combining it with the light from the

51% MORE LIGHT WITHOUT FASTER LENS

Output is 51% greater than any lomp using projection lenses with focal lengths of over 4", with 35 mm or any width film, process or aperture.

DELIVERS UP TO 65,000 LUMENS!

PROJECTS:

46,000 lumens for smoll aperture 35 mm pictures (.825 x .600) 55,000 lumens for CinemoScope 35 mm (.912 x .715)

56,000 lumens for MGM 65 mm and Todd-AO 70 mm. 65,000 lumens for Fox CinemoScope 55 mm (1.340 x 1.06)

VARIOUS CARBONS CAN BE USED!

A 10 mm x 27" non-rotating Ultrex positive, which passes through the center opening in the ouxiliory mirror, is burned with o rotating 7/16 x 12" solid grophite negotive at 140 to 160 amperes and 70 to 78 volts. A 10 mm x 25" Hitex positive may be burned at 125 to 140 amperes or a 10 mm regular positive of 110 to 125 amperes.

LARGEST MAIN REFLECTOR EVER USED!

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EXCEPTIONALLY COOL OPERATION!

Over-all size 45" x 29" x 43". Direct rodiotion from the orc practically eliminated by surrounding reflectors. Complete change of air every six seconds. Auxiliary reflectors, positive and negative corbon heads water cooled.

QUICKER, MORE POSITIVE STRIKING!

Separote single action manual control automatically positions the arc for proper gap length.

PROJECTION ROOM HEAT CAN BE CUT!

New 230 volt, three-phose selenium componion rectifier con be located at any distance from the lamp and the power adjusted remotely at the lomp instrument ponel.

REQUIRES 15-20% LESS POWER

thon any other lamp at a given corbon burning rate. For further details, literoture and demonstration see National Theatre Supply Company. Bronches in all principol cities.











OMMERCIAL 16-millimeter projection has assumed important proportions in many parts of the country. Professional projectionists are often called upon to operate smallgauge equipment, and it would appear that many of us should gain the knowledge which will make our efforts stand out as that of a professional.

Many Local Unions have neglected the field of 16-mm mainly because few projectionists are willing to take the time to learn the myriad possibilities and limitations of the narrow film system. It has been amply proved, however, that intelligent effort can bring in a significant amount of work to the Local Union. More important, competent handling of such casual performances will help to sell more services.

Before looking at some of the factors which have been established as of paramount importance, a few words may be appropriate as to the best means of securing calls for 16-mm projectionists.

The Local Union may wish to insert notices in the classified pages of the telephone directory. The "Yellow Pages" will bring in work and in larger cities will be cheap in relation to the results achieved. In smaller towns, the direct approach may do the job. Convention bureaus, hotel, and auditorium managers may be approached either in person or by mail. Such approaches need do little more than quote rates and tell where to call to obtain services. Most buildings where 16-mm equipment is used (with the possible exception of schools) are not intended for motion pictures, and the managements are happy to have the grief which usually accompanies film presentation become the responsibility of others.

The Equipment Problem

Let the news be disseminated that the Union will furnish projectionists, then what is the best answer to the equipment problem? First, many organizations which ask for commercial showings own their own equipment. Others rent equipment from some organization in the business of renting projectors; and not infrequently the Union will be asked to furnish everything except the film. In this latter case, the Union may decide to purchase its own equipment, or better still may make a reciprocal arrange-

16-mm projection has become increasingly important, and has given rise to its own special problems; it has also been neglected by the

Professional 16-mm **Projection**

By JOSEPH HOLT Member, IA Local 428, Stockton, Calif.

ment with a rental agency wherein the agency refers all requests for projectionists to the Union, and the Union rents all equipment from the cooperating agency.

The foregoing is largely an administrative problem best answered by the affected group, and the suggestions given are merely illustrative. It is important that a central office be used, where calls may be received, assignments given, and records are kept.

At the central office, the person receiving the call must ascertain where the performance is to be held; the exact time and date for the setting up of the equipment and the actual performance; whether the equipment is to be furnished by the employer, an agency, or the Union; the size of the audience, and the person to whom

professionals.

TABLE OF PICTURE WIDTHS

(16-MM APERTURE) Projection Distances (Ft.) 25' 35' 50' 56" 78" 112" 45" 63" 90" 37" 52" 75"

Dimensions shown in boxes represent image widths, in inches, with given throw and lens size.

the projectionist is to report.

The Local Union office should be equipped with a card file on public buildings, clubs, fraternal body meeting places and the like. This file should show the room dimensions, approximate maximum seating capacity, description of power available, and whether or not a suitable screen is part of the auditorium equipment.

The reader may ask why these questions are important to the projectionist. Let the room dimensions be considered. If the estimated audience size indicates that the room will be rather crowded, there will be a problem as to sound distribution; there will probably be a placement problem for the projector. We will deal with these presently, but let consideration be given to the nature of the power available.

Some buildings still have direct current supplied to the public assembly areas, and we must know for a fact that a 20-ampere capacity circuit (or more) is available to us. If direct current is the only supply available, we must furnish an inverter in order to operate the sound amplifier for the projector.

As to the presence of a screen at the performance site, it seems hardly necessary to point out that even a roll-up screen on folding tripod legs is somewhat cumbersome to transport and adds to the projectionist's job. But let us make no mistake: a screen in good condition is a must! Never should a professional be tempted to project pictures on large tablecloths, sheets, or even bare painted walls. If the reader has much experience with the work of the neophyte, he will not be amused by the last sentence. Such travesties do occur!

Advantages of Accessories

The writer has found that certain accessory equipment will add greatly to the success of the commercial 16mm show. The projectionist should know where to obtain sturdy projection tables or stands which will extend to a height of at least 42 inches; projection lenses of 21/2 inches and 3 inches of the proper barrel diameter for the projector in use; a 16-mm splicer; a small brush such as that used on electric shavers for use on the tiny apertures, and good quality lens paper. The last three items should

(Continued on page 22)

Projection CLINIC

Color Factor of Projection Light

THE COLOR of projection illumination is an important factor in the showing of natural-color films. Color prints for use in theatres are chromatically balanced for the white light of the high-intensity carbon arc. The use of yellowish light sources for projection has the bad effect of darkening the green, violet, and blue colors and makes the reds, oranges, and yellows appear excessively bright. The yellow-amber color of mazda and low-intensity illuminants may be expressed by trichromatic ("3-color") specifications, thus eliminating guesswork and false subjective impressions.

White light stimulates the three primary color receptors of the human eye to a degree which is assumed to be equal. An arbitrarily selected "standard white," such as mean noon sunlight (a "color temperature" of 5500° on the absolute Kelvin scale), may thus be specified as "Red = 100 relative intensity units, Green = 100 r.i.u., and Blue = 100 r.i.u."

To simplify the specification, we may write R_{100} : G_{100} : B_{100} , or even 100:100:100 when it is understood that the numbers refer to the relative visual excitations of the red, green, and blue color receptors, respectively.

On the basis of R:G:B = 100:100:100for a white that matches mean noon sunlight in color, the color of LI-arc radiation (3900° K.) is expressed by 100 : 81.1 : 53.3 as determined by new measurements of color made by Robert A. Mitchell, IP's contributing editor. This specification means that the relative intensity of green visual excitation by the LI arc is only about 0.8 of the intensity furnished by standard noon sunlight, and that the relative intensity of the blue is only about one-half that supplied by standard noon sunlight. "White" light deficient in green and blue appears yellowish in comparison with standard white!

Incandescent tungsten ("mazda") illumination is even more yellowish than that of the low-intensity carbon arc! The light of the average household 60-watt bulb (2800° K.) is specificed by 100: 63.1: 25.1, while that of the average 1000-watt projection bulb (3200° K.) is 100: 70.3: 34.7.

The raw light from the average highintensity carbon arc under normal burning conditions is actually a very slightly bluish white (about 6000° K. = 93: 95:100) similar to "average daylight" (6500° K. = 88:92:100), but not so bluish as north skylight (15,000° K. = 53:62:100). Reflection from the lamphouse mirror and the screen usually "yellows" HI are illumination and reduces its color temperature to that of standard mean noon sunlight (5500° K. = 100:100:100). This is satisfactory for good reproduction of correctly balanced color prints.

When Tubes Go Wrong

THAT OLD "chestnut" about a bad tube being an excessively hot tube is absolutely false. If you discarded from your amplifier every tube that burns your fingers when touched, you should have to throw away all the rectifier and power tubes! Tubes get hot because they have lighted filaments and electron-heated plates. Those that handle large amounts of power are expected to become "too hot to handle"!

The identification of a bad tube is easy only when the filament has burned out. In that case the tube fails to light up when the amplifier is switched on. But what about the tubes that light up and appear normal even though they cause weak or distorted sound?

It is usually difficult to pinpoint a gradually failing tube. The sound may deteriorate so slowly that it becomes quite bad before the projectionist is able to hear the fault above the unavoidable noise of his projectors. Periodic checks of sound quality in the auditorium and the use of a correctly matched and filtered non-sync (disk-record player) enable the projectionist to be among the first to notice the effects of an ailing amplifier tube.

When worse comes to worst, all amplifier tubes should be checked by the simple process of substitution. Each tube is replaced by a brand-new tube

while a test film or disk record of hi-fiquality is being played. The sound suddenly improves when the offending tube is replaced by a good one.

The substitution procedure requires spares for all of the many tubes used in an amplifier and its associated "power-pack" (transformer-rectifier) apparatus. An adequate stock of extra tubes is always the best protection against show-closing sound outages, for to operate day after day without spares is to tread a perilous path to ultimate disaster.

Causes of Tube Deterioration

The tubes that deteriorate the most rapidly and produce the worst distortion are the power-gain, or output, tubes. These handle relatively heavy plate currents. Among the power tubes most commonly used in theatre amplifiers are the following: 205-D, 300-B, 1620, 42. 6J7, 6L6, and 6K6.

"Gassy" amplifier tubes cause severe distortion and erratic output. The presence of gas in tubes sometimes reveals itself as a heavy blue-violet glow inside the elements when the tube is in usc. As a rule, the bad effects of air in a tube develop gradually as the tube warms up. The heat slowly drives the gas molecules from the metallic surfaces on which they are "adsorbed."

It is always a good idea to replace visibly gassy voltage-gain and power tubes. Rectifying tubes that give a bluish glow when operating are not necessarily bad, however. Some rectifier tubes contain small amounts of argon gas to increase the flow of electrons from the cathode (filament or heater jacket) to the plate, and hence exhibit a weird glow between these two elements when working properly.

Low electron emission from the cathode is a common failing of wornout tubes, and results in weak, "mushy" sound. This fault is detected with a milliammeter or tube-tester. An excessively low plate-current reading indicates that the tube has deteriorated.

When the proper value of the plate current of a tube is not known, reduce the filament voltage slightly. This will not cause an appreciable reduction of plate current in the case of a good tube. If the milliammeter needle drops to a low value when filmament voltage is only slightly decreased, the tube is clearly unfit for further use.

While tubes are the only components which normally wear out in an amplifier, it must not be presumed that bad tubes are the only cause of bad sound. "Leaky" or otherwise defective coupling condensers can cause noisy sound and distortion. A damaged output or impedance-matching transformer has an equally bad effect upon the sound.

The function of this department is to provide a forum for the exchange of news and views relative to individual and group activities by members of the organized projectionist craft and its affiliates. Contributions relative to technical and social phases of craft activity are invited.

In The SPOTLIGHT

N ONE of our lighter moments we struck off a bit of copy which, positioned in last month's Monthly Chat, explored the possibility of our technical boys—cameramen and projectionists—getting a piece of this money which accrues to the "artists" from the re-running of feature films on TV.

The aforementioned piece was strictly (so we thought) a spoof, a piece of whimsy which merely directed attention to another nodal point of inanity on the part of a section of an industry hell-bent toward self-destruction.

Think you not that our whimsy didn't suddenly develop serious overtones? It did indeed! No sooner had IP reached the West Coast than there issued from our blue-blooded kinfolk, the lordly cameramen, the solemn pronouncement that from now on, from this day forth, and in the future, ad infinitum, the technical boys would be running in full cry down the trail leading to a piece of the re-run TV movie dough.

This development, while wholly unexpected on our part, could merit no less than our complete approbation—the while we pondered the fact that in no other industry in the world, in no other locale but Hollywood, would it be possible to translate a fairy tale into reality.

- A note for photography enthusiasts: The 18th North American International Photographic Exhibit will be held August 27 through September 7, 1958. Closing date for entries of prints is July 25 and for color slides August 8. Entry blanks may be obtained from the California State Fair and Exposition, Box 2036, Sacramento 9, Calif.
- Add the name of Fred Deems to that ever-growing roster of men passing the 50-year mark in the projectionist craft. A member of Local 323, Springfield, Ill., Deems began his career as a projection-

In Memoriam

HARRY SHERMAN

MARCH 3, 1952

ist in 1905 when he took a job at the Gaiety Theatre in Springfield operating a Selig hand-crank machine. Electricity for the lamps was obtained from two horseshoes in a rain barrel and from rheostats. No magazines were used in those days—just a spindle on top with the film running out into a basket. In addition to his duties as a projectionist, he took tickets at the door and ran the spotlight. His weekly salary totalled \$9—\$5 for operating the projector, \$3 for taking tickets at the door, and \$1 for running the spotlight.

Deems retired from full-time work two years ago but takes an occasional job as

- a relief projectionist. His son, Barrett, is a nationally known drummer, playing with the Louis Armstrong band.
- The 1958 edition of the AFL-CIO Union Industries Show, sponsored by the AFL-CIO Union Label and Service Trades Department, will be held in Cincinnati, Ohio, April 25 to 30.
- The recently elected officials of Local 431, San Jose, Calif., were obligated by senior past president C. H. Tillson. Tillson held the office of Local president for 27 consecutive years.
- Jack Lang, treasurer of the Credit Union established last year by Detroit Local 199, reported an enrollment of 98 members and a capitalization of about \$30,000. Loans in varying amounts up to about \$2,000 have been made to members upon application. Local 199 officials expressed their satisfaction with the functioning of the Credit Union and look forward to additional benefits for the members.
- Mayors seem to run in the family of Jacob Pries, business representative for Local 225, Atlanta, Ga. To be specific, his nephew, Robert King High, is the present mayor of Miami, Fla., and his son-in-law, A. H. Lurie, is mayor of Florala, Ala.
- After 49 years of projection work, Harry Browne, member of Local 519, Mobile, Ala., decided to call it a day and retire. An ardent disciple of Isaac Walton, he plans to spend his new-found leisure time fishing along the shores of Week's Bay in Baldwin County.
- Projectionist Local 348 of Vancouver, B. C., Canada is engaged in an all-out

SPRINGFIELD (ILL.) LOCAL 323 HONORS FIFTY-YEAR MEMBER



Fred Deems (second from right), 50-year member of Local 323, Springfield, III., is shown receiving a solid gold life membership card from Charles E. Horn, Local president. LeRoy Upton (extreme left), I. A. representative, and F. V. Gard (extreme right), vice-president of the Local, witness the presentation. Only two other members, Walter E. Bryner and Lee W. Brownlow, were the recipients of similar awards.

war with the Exhibitors Association there on an issue which centers on the use of acetate rather than nitrate film. The Association has made representations to the province's Attorney General that all nitrate film be banned throughout the entire territory, their idea being that once this is done there will follow the speedy elimination of the requirement for projectionist examinations.

The Union acknowledges that acetate film is slow-burning but points out that the rate of burning in itself makes it no less a hazard than nitrate, panic in a theatre not being contingent upon a chemical composition.

The Union also points out that the records of the National Fire Protection Association, kept since 1898, show that only 22% of theatre fires are traceable to nitrate film, while 34% were directly applicable to strictly electrical causes.

Palpably the exhibitor stand is an effort to slash projection standards for the usual economic reasons, which fact seems to be well understood by persons both inside and out of the provincial government.

• Mr. and Mrs. P. A. McGuire observed their golden anniversary on February 22 at their home in Amityville, Long Island, N. Y. "Mac," as he is affectionately known to thousands of projectionists throughout the country, was for many years the advertising manager and industry relations counselor for International Projector Corp., manufacturers of Simplex visual and sound projection equipment.

Now 83 years of age, "Mac" was ever the champion of the projectionist as the



P. A. McGUIRE

key man in the entire chain of motion picture production and exhibition, and he was and is tireless in his efforts toward the improvement of the art and craft of projection. He coined and publicized throughout the world the slogan "Better Projection Pays." Moreover, he demonstrated repeatedly his interest in the craft by countless acts of friendship to projectionists throughout the country. Just a postcard to "Mac" at Bayview Avenue, Amityville, would, we are quite sure, let him know that he is still tops in our book.

IA ELECTIONS

LOCAL 186, SPRINGFIELD, MASS.

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LOCAL 249, DALLAS, TEXAS

Herschel O. Miller, pres.; John B. James, vice-pres.; Harvey D. Hill, Jr., rec.-sec.; Curtis J. Moore, fin.-sec.; Harvey D. Hill, Sr., bus. rep.; James M. Blaydes, Jr., sgt.-atarms; Luther C. Clark, Sam Hoffman, Jasper Barron, trustees.

LOCAL 332, CLINTON, IOWA

Chauncey Andrews, pres.; C. Tintey, vicepres.; A. E. Hubbard, sec.-treas.; Paul Nadelhoffer, bus. rep.; C. E. Baker, Charles Snyder, C. Tintey, trustees.

LOCAL 431, SAN JOSE, CALIF.

William P. Brewer, pres.; Sam M. Howard, vice-pres.; Edward M. Collison, correc. sec.; Harland L. Jackson, treas.; Fred E. Skinner, bus. rep.; Irving W. Haagen, sgt.-at-arms.

LOCAL 439, NEW LONDON, CONN.

Eric Crawshaw, pres.; Leslie Nowell, vice-

Eugene Atkinson

EUGENE ATKINSON, business representative of Chicago Motion Picture Machine Operators Union Local 110 for the past 14 years, died of a heart attack after an illness of three days at Montego Bay, Jamaica, B. W. I., on March 5. Thus ended one of the most colorful careers in the annals of the I. A., a career compounded of bitter disappointments and brilliant successes, but always underscored by an undeviating and relentless concern for true unionism as represented by the rights of the individual, usually the underdog.

A member of Local 110 for more than 40 years, Atkinson was overwhelmingly elected its business representative in a special election held in 1944 at the direction of the I.A. and following the elimination of the control group appointed by I.A. President Richard Walsh's immediate predecessor. Atkinson's assumption of office was all the more strange since it followed by only a few years his outright expulsion from the I.A. by a group since wholly discredited.

Repeated elections within Local 110 in the years intervening since 1944 have served to confirm the widespread high regard in which Atkinson was held locally and throughout the I.A.

He is survived by his widow Jennie, known affectionately throughout the I. A. as "Tommy".

pres.; John S. Kane, fin. sec.-treas.; Benjamin H. Rose, rec.-sec.; Fred Nowell, bus. rep.; Thomas Kenure, Anthony Osowski, W. W. Lucas, trustees; F. Nowell, delegate, and W. Lucas, alternate delegate to Third District; Nowell and Lucas, delegates, J. Kane and Robert Hyde, alternate delegates, Central Labor Union.

LOCAL 584, BRECKENRIDGE, TEXAS

John Creagh, pres.; D. P. Clark, sectreas.; J. H. Davis, bus. rep.; Alvin Stone, sgt.-at-arms.

LOCAL 865, ODESSA-MIDLAND, TEXAS

T. J. Bentley, pres.; Glen Gullatt, vicepres.; S. E. Furlow, sec.-treas.; Barney T. Holt, bus, rep.; Richard Neel, sgt.-at-arms.

BOOK REVIEW

THE AUDIO-VISUAL EQUIPMENT MANUAL, by James D. Finn; 360 pages, spirally bound for flat opening of sheets 11½ inches wide by 8¼ inches deep; visual thumb index; equipment supply sources, and bibliography. Published by The Dryden Press, 110 West 57th St., New York City, 9. Price: \$7.50.

This book measures up in every conceivable respect to the importance of the topic and the stature of its author, who, incidentally is widely known and respected as a professor of visual education at the University of Southern California. Its editorial excellence is fully matched by its obvious production values which render it a delight to the eye and a boon to quick, easy and accurate reference.

The manual itself sets forth its basic possible uses: (1) in the laboratory phases of the courses in audio-visual education now required of or elected by teachers; (2) as a basic text for operator's clubs and classes in high schools; (3) in instructor-training programs in commerce, industry and the armed forces; (4) as a basic reference book for the individual school, church, industrialtraining center, and home enthusiast; (5) as a reference for equipment dealers and salesmen, and (6) as a reference book for adult groups that use A-V equipment extensively in their meetings -P.T.A., service clubs, unions, etc.

Beginning with an outline of the general theory of projection and extending through a long list of A-V equipments, including the all-important matter of operating technique, this volume utilizes text and illustration fulsomely to admirably discharge the function for which it was intended. This reviewer being one who is active in the 35-mm professional field can only express his rueful regret that his own field is not accorded just such a benefit.

The indicated audience for this book should rise up to the last man and shout "hooray" for its availability. For them, it's a "must'.

National's New 110-160 Amp. Arclamp With Jet-Shaped Arc, Dual Mirror

UTILIZING a totally different system of producing light by a carbon arc, and establishing thereby new standards of screen illumination, is the Ventarc lamp just announced by National Theatre Supply Co. It is a reflector lamp which uses a smaller mirror to supplement the 21-inch main reflector and to shape the light beam at the arc itself, as contrasted with the conventional method of using a single mirror to pick up the light.

This new Ventarc technique forms a three-dimensional, cylindrically-shaped arc source which permits the use of a highly efficient optical system. The form of the arc is changed by air pressure from jets arranged in concentric circles around the positive carbon so that they strike the burning end of the electrode—hence the descriptive term "blown arc." Air pressure is supplied by a blower which is an integral part of the lamp.

Constricted Arc Brilliance

In the process of reshaping, the arc stream is constricted, it is explained, and since the brilliance of an arc increases with its constriction, the light source assumes a much higher degree of brightness. "In fact," states the manu-

facturer, "the increase in light is approximately 51% greater than that of any lamp heretofore available when using projection lenses of over four inches, and 30% with lenses of up to four inches.

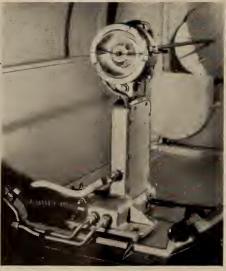
"The light pickup angle, due to the cylindrical shape of the arc, can be increased to more than 260°. To utilize this increased available pickup angle, an auxiliary 6-inch spherical mirror has been positioned behind the positive carbon to supplement the pickup angle of the conventional arc lamp reflector, which is 160°.

"The light thus gained from these extreme pickup angles is reflected by the auxiliary mirror to the main mirror, to be combined with the light which has been picked up directly from the crater. The lumen total on the screen is increased 12-15% by this auxiliary mirror."

Ratings for All Processes

The arc functions equally well in the projection of any width of film by any of the various processes and with any size aperture, and the greater light output is said to be available even with 35-mm film and an f/1.7 or f/1.8 lens, the gain not being dependent upon the use of a faster lens.





(Left): Main mirror, which is an integral part of rear door of new National Ventarc projection arclamp. (Right): Positive carbon feeding head and auxiliary mirror of new National Ventarc projection arclamp.



Exterior view of the new National Ventarc projection arclamp.

Light output ratings are given by the manufacturer as follows: standard aperture (0.825 x 0.600) 35-mm film, 46,000 lumens; CinemaScope 35-mm (0.912 x 0.715), 55,000; M-G-M 65-mm and Todd-AO 70-mm, 56,000; and for CinemaScope 55-mm (1.340 x 1.06), 65,000. Screen light distribution is rated at a minimum of 80% through a 35-mm aperture and an f/1.7 or f/1.8 lens, "up to 100% at the will of the projectionist."

A 10-mm x 27-inch non-rotating Ultrex positive carbon, which passes through the center opening in the auxiliary mirror, is burned with a rotating 7/16-inch x 9-inch solid graphite negative at 140-160 amps., 70-80 volts. Also, 10-mm x 25-inch Hitex positives may be burned at 125-140 amps., or 10-mm regular positives at 110-125 amps.

Cool Operation Assured

The main reflector is a 21-inch "cold" type, with a 6½-inch focal length and a 42-inch working distance; it is an integral part of the rear door and need not be changed for any film width from 35- to 70-mm. Nor need the position of the burner ever be changed, it is stated, since all focusing is done by shifting the main reflector. A convenient handle changes aperture spot size to meet the needs of any process and film width.

Due to the generous size of the lamp—in inches, 45 long x 29 wide x 43 high (Continued on page 26)

AUDIO · VISUAL

Fastest Zoom Lens by B & H

NEW LENS that enables the amateur movie maker to "zoom in" on his subject with all the impressiveness of a TV sportscast has been introduced by Bell & Howell. The lens fits 16-mm movie cameras. With a maximum lens opening of f/2.2 it is the fastest zoom lens on the market having a 4-to-1 range of focal length variation. Turning the zoom handle changes the focal length of the lens from wide-angle to normal to telephoto, affording the versatility of many lenses in one. It also permits the movie maker to keep right on shooting while switching from closeups to long shots.

Zooming is ideal for special effects and for action scenes. In travel films the lens is particularly useful. In filming a market place, for example, you can make a wide-angle shot to establish the locale. Then you can quickly switch to telephoto length for closeup scenes of such things as a church spire or doorway, a picturesque old woman weaving a basket, and other details which make your film story complete.

The focal length of the new zoom lens is continuously adjustable from 17 mm or about 2/3 inch (wide-angle) all the way to 68 mm or about 2-2/3 inches (telephoto). The four-to-one ratio in focal length represents a 16-time change in the area viewed by the lens. At the maximum telephoto setting the subject image is 2.7 times larger than the image obtained with a normal lens.

The lens is equipped with its own reflex viewfinder, which shows exactly what the lens sees at all times. This eliminates all parallax problems (such as cutting off part of the subject at close range). The viewfinder system provides direct through-the-lens focusing. You can even see the total region of sharpness covered by the lens at a given focusing setting as you look through the viewfinder.

No exposure increase is required when the focal length is increased, a signi-



Latest model B. & H. zoom lens covers range from 17-mm (wide-angle) to 68-mm (telephoto). See-thru lens affords direct focus.

ficant development in optical design.

A ring at the rear of the viewfinder opens and closes the eyepiece shutter, preventing stray light from entering the optical system when the find is not being used for viewing. An eye-cup shuts out distracting light from the user's vision. It is removable for the convenience of those wearing glasses.

For the first time in a lens of this type, compactness, speed, excellent resolution and crisp sharpness at all focal lengths are combined. The high optical correction and outstanding image contrast constitute a major achievement in photographic optics. The lens measures only 4½ inches in length and is unusually light in weight for a zoom lens. It is standard equipment on the new Bell & Howell 240-Z camera, which features automatic threading.

Ampro's Stylist 16-mm Line

Ampro's Stylist line of 16-mm sound projectors is designed specifically for the heavy usage required of projectors in the audio-visual field. They are completely flexible in operation; have both sound and silent speeds. They are lightweight, functional, extremely compact units. Rheostat control for variable silent speed, governor controlled for constant sound speed. Standard medium prefocused T-10 or T-12 lamps up to 1000 watts are accommodated.

Simple straight line film path is very easily threaded. Triple claw movement engages three film sprocket holes simultaneously, feeding them perfectly. Has a threading light. Threading diagram conveniently visible on projector housing. Slide-out removable film gates are easy to clean.

All film bearing surfaces are flame plated for increased efficiency and extra long life. Micromatic lamp adjustment



Latest model of the improved Stylist Ampro 16-mm sound-film projector.

—Aspheric condenser lens—film capacity 2000 feet—interchangeable lenses, coated Super 2-inch //1.6 lens, standard equipment replaceable either by 1, 1½, 2½, 3, 3½, 4-inch coated lenses.

Sound drum and filter mounted on precision ball bearings. Sound optical system projects light from exciter lamp directly through semi-cylindrical lens, eliminating mechanical slit and mirror. Prefocused excitor lamp cannot be inserted wrong. Conveniently placed jack receptacle for microphone or phonograph—includes bottle of Ampro oil, cleaning brush, box of fuses, 40-foot speaker cable, 400-foot reel and instruction book as standard equipment.

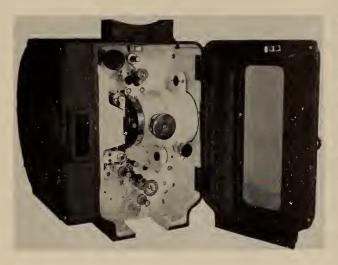
Radiant's New Screen

WITH AN EYE to providing an inexpensive screen with deluxe features, Radiant Manufacturing Corp. has announced production of its new Picture-Master low-priced projection screen.

The screen incorporates an automatic "toe-tip" leg opening, molded metal handle, and a metal fabric support-bar which does not allow exposure of screen fabric when the screen is closed. There is also Radiant's tear-drop case. and a molded metal goose-neck hanger. The fabric is glass-beaded Hy-Flect. All square sizes for slides may be quickly converted to oblong for motion pictures. PictureMaster comes in eight sizes, ranging from 30 x 40 inches through 70 x 70 inches.

EASTMAN KODAK has released a new Kodak Film Cleaner that is said to eliminate any hazard from flammability in cleaning black-and-white and color negatives or transparencies. The improved cleaning solution is applied with a soft lintless cloth to remove dust and dirt from films.

Century's New Projector Mechanisms



New Century projector head for Model H (single shutter) ond Model HH (double shutter). Shown here is the new lens mount with single, heavy, center-driven focusing adjustment with provision for oir-cooling for larger projection lenses. shown is the removoble end beoring of the intermittent movement, allowing for easily replaceable intermittent sprockets. Stondord oir - cooled, curved film traps and gotes ore shown, os well as the new "air flow" removable shutter guard.

CENTURY Projector Corp. has announced a new line projector mechanism which will take the place of the Models C and CC. These new mechanisms will be known as the Model H (single shutter), and Model HH (double shutter).

The simplicity, sturdiness and longlife features of the Models C and CC mechanisms have been retained. The new mechanisms include advances and improvements developed for such outstanding successes as Cinerama, horizontal VistaVision, Cinemiracle (opening shortly at Grauman's Chinese Theatre in Hollywood, and the Roxy in New York) as well as some of the features incorporated in the 20th Century-Fox 55-35 mm projectors yet to be announced.

Many Advanced Features

They are patterned on mechanisms designed for non-standard film widths (wide films) and can therefore be modified for use with "wide" films, whenever such films are available commercially. These new Model H and Model HH mechanisms include as standard equipment many new features, including:

Heavier main frame designed for the new "air flow" cooling which greatly reduces film trap and aperture temperatures.

Shutter guard and shutter operation for higher efficiency light transmission. Can be used with f/1.5 light speed arclamps, thus providing for all foreseeable future developments of arclamp designs and new arclamps recently announced.

Curved film traps and gates which have proven so beneficial for reduced film distortion, with clearer, sharper pictures under even the most adverse conditions.

New lens mount with single, heavy, center-driven focusing screw and support. This design provides smooth, even,

non-backlash focusing control, even with extra long lenses. The new lens clamp firmly grips the lens over most of its length and provides for air circulation around the lens, thus reducing lens operating temperature. This mount helps prevent out-of-focus drift caused by changing lens temperature.

The new gate mount provides for using large rear element (high speed)

short focal length lenses, at the same time providing protection for the lens against mechanical damage, dust, and light obstructions.

New curved gate provides quiet operation, with gate shoe tensions adjustable above and below the aperture, thereby assuring top picture presentation.

New Intermittent Movement

The intermittent movement is entirely new, having a larger webbed starwheel, a larger starwheel shaft, a larger cam, and a larger cam pin.

The new intermittent sprocket may be easily reversed or changed. The mounting of this sprocket to the starwheel shaft is patterned after the mounting developed for use with multiple projection mechanisms such as Cinemiracle, where picture steadiness is most critical. The combination of larger webbed starwheels, larger starwheel shafts, and advanced sprocket mounting results in steadier, clearer pictures with sharper details.

New non-magnetic self lubricated pad rollers provide extra protection against film damage and reduce depreciation of magnetic prints. Water-cooled film apertures are optional in the Model H and Model HH mechanisms.



To the Editor of IP:

Relative to the article "Inspecting & Repairing Prints" published in your February issue:

From the tone of this article, I should judge it was prepared a year ago, since the author actually advocates cutting and splicing theatrical films as a cure-all, and seems to know nothing of the new buttsplicing process with Mylar transparent tape. He proposes ". . . when the edges of the film get crushed, the projectionist may have to remove many feet, even from a print which has never been shown before."

He states that tears, missing and torn perforations require "butchering important scenes." He also says "more than two successive torn perforations require that the film be cut and spliced."

Not wishing to criticize in a destructive manner, although I shudder at the proposed use of "sandpaper blocks" for scraping film, it appears that our Magic Mylar Transparent Sprocketed Splicing Tape has only recently been called to the author's (R. A. Mitchell) attention.

Having already sold thousands of rolls of Magic Mylar to theatres, along with our line of F & B Splicing Blocks, and having received hundreds of letters congratulating us because torn film and torn sprockets can now be repaired without losing a

single frame—and butt-splices can now be made on any film base—we resent the following statement by the author: "Although Mylar taped joints are very strong, there are objections, mechanically, to them". He closes the subject without naming even a single "mechanical" objec-

Mylar has been unfairly treated, don't you think? Since you are accepting our advertising on this product, shouldn't you require substantiation of this attack on it? In defense of Mylar splices versus cement

splices, we offer the following facts:

Mylar splices are 10 times stronger than

Mylar splices are 10 times stronger than the best cement splice.

Mylar splices (on both sides of the film) 3/1000 of an inch thick—are still thinner than cement splices and go through the projector more easily.

Mylar splices are not affected by extremes in temperature or regular cleaning fluids.

Expensive "hot-weld" type splicers are not necessary to apply Mylar. Actually no block at all is necessary—but a 35-mm splicing block can be purchased for as little as \$12.50.

Add to these advantages the obvious value of not having to "butcher important scenes" or cut out "several feet of new prints"—but rather preserve and repair film, without loss of a single frame. I can

think of at least 8 other advantages, but for the sake of brevity will not list them here.

The "refusal of theatre owners to purchase modern hot-weld machines" (at \$300 to \$1200 each) really cannot be compared with the refusal of Mr. Mitchell to fully investigate the advantages of Magic Mylar for splicing and repairing film.

ARTHUR FLORMAN

Florman & Babb, Inc.

COMMENT: Justifiably Mr. Florman is proud of his product. It would seem, however, that what is involved here is not so much the quality of a product but a personal preference for a given operating technique; in other words, procedure. Procedural habit is strongly ingrained in projectionists, particularly those whose experience covers a long span of years.

Simplex Manufacturing at GPL

The manufacture of Simplex motion picture theatre projectors, sound systems and associated accessories is now being done at the plant of General Precision Laboratory, Inc., at Pleasantville, N.Y. All manufacturing operations of the GPL subsidiary, Simplex Equipment Corp. (formerly International Projector Corp.) at its Bloomfield, N. J. plant will cease on March 31.

The Simplex headquarters and a number of key Simplex engineering and sales personnel are being transferred to Pleasantville. GPL personnel were responsible for the design and production of the first systems for CinemaScope projection and stereophonic sound as well as for the curved projector gate and the recently introduced 5-to-1 projector intermittent movement.

The full line of current Simplex equipment will continue to be available through the 27 branches of National Theatre Supply Co.

New Nat'l Projector Carbon Bulletins Available

A new series of quarterly bulletins are now available to projectionists from National Carbon Co. These are an upto-date version of the company's previous Projector Carbon Handbook in a revised format.

The bulletins contain operating data, screen illumination tables, characteristics and optics of the various types of projector lamps, and other information of direct interest to the projectionist. Supplied with the first copy of the bulletin is a three-ring binder in which all issues can be permanently kept.

Bulletins and binder may be obtained from Mr. C. G. Ollinger, National Carbon Co., 30 E. 42nd St., N. Y. 17, N. Y.



16-MM PROJECTION

(Continued from page 14)

be carried by each projectionist; the high table will make any job look better, and the longer focal length lenses will enable the projectionist to consider a more distant location for the projector and thus clear the seating area for viewers.

Other items which will become necessary are proper power and speaker extension cords in the event that the projector has to be moved.

Projectionists accustomed to theatre screen sizes are usually somewhat surprised at the 54-inch x 72-inch size of the commonly encountered screen in 16-mm work. As a matter of rule, if the most distant viewer is to be within a distance equal in feet to onehalf the width of the screen in inches, the screen may be used with satisfactory results. This would mean for example, that the 72-inch screen would compute as follows: one half 72 is 36; if the farthest spectator is within 36 feet of the screen, be confident. Then we come to the problem mentioned previously. Let us assume that the normal 2-inch lens is to be used on the 72-inch screen. Our throw would work out just a bit over 32 feet. We would be four feet into the body of the audience, and a good effective presentation is virtually impossible. The answer? A 2½-inch lens will place us 40 feet from the screen, and four feet behind our nearest viewer. The difference will be readily appreciated, and will pay both in extra fees and future calls for service.

Be Unobtrusive

Extension speaker cords provide another important difference in the work of the professional projectionist. All

MITCHELL'S MANUAL OF PRACTICAL PROJECTION

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Century Projector Corp.

Proudly Announces

two all-new models of the finest motion picture projectors ever made

MODEL H-Single Shutter
MODEL HH-Double Shutter

such leads should be run unobtrusively around the wall. In fact, this idea of keeping the equipment and the associated parts in the background is the very essence of good 16-mm showmanship. The projectionist should complete setting up the equipment and testing it before a single person is present who will view the show. During other parts of the program he should remain out of sight, but as close to his equipment as possible. If the program is not concluded with his portion of the show and speakers are to follow, common courtesy and good business demand that he refrain from dismantling and packing his equipment within sight or sound of the audience.

The reader will note that nothing has been said about the actual running of the show. Every qualified projectionist will give the necessary attention to volume and focus, and in the experience of the writer, will seldom encounter any difficulty during the performance itself. For that reason, it has been thought more important to dwell upon the all-important preparatory moves which make 16-mm shows stand out when presented professionally.

Spare reel driving belts should be in the projectionist's possession. They have a way of breaking when the reels are longest and the hour is the most inconvenient for finding replacements. Any projectionist who goes on a 16-mm job which uses a filament lamp without a spare at hand is merely asking for embarrassment. How comforting to the sponsor of the occasion to be informed: "Don't worry; I happen to have a spare of the correct type with me." That is what it all adds up to: *Preparedness*.

The professional is prepared to render competent service at a professional fee. Because of his training, experience, and technical knowledge he can bring new standards of quality to the 16-mm field. And by being prepared to cope with the unusual, the challenging, and the difficult, the professional projectionist in the 35-mm field is the logical person to make the transition.

- BRIGHTER LIGHT
- LONGER BURNING
- SHARPER PICTURE

Free Test Samples



STEADIER LIGHT
LESS ATTENTION
PERFECT COLOR BALANCE

Free Carbon Chart

PROJECTION PROBLEMS

(Continued from page 12)

by sound service companies—some quarterly, some every two months and a few monthly.

However, some general observations were made. Many theatres use single track magnetic pickup or a mixing device. This often results in poor quality reproduction due to phase cancellation or atentuation when the magnetic reproducing system is used. Theaters with this type of equipment use their optical system where there is a choice, as with the magoptical release prints.

Very often, however, components in the optical reproducing system are obsolescent or sub-par compared to equipment developed in recent years. When magoptical prints are shown due to the narrower width of the optical track, it is often necessary to run sound level at maximum output thus increasing distortion and causing an undesirable signal-to-noise ratio.

Some theatres have met this problem by installing a photocell to mag pre-amp compensating network which permits use of the magnetic amplification system for optical reproduction.

Recommendations were made to executive management on the desirability of upgrading sound quality wherever the need was indicated. Improvement in recent years of speaker systems and amplifier components, and the public's growing awareness of good or poor quality sound (with the increasing widespread interest in high quality home music systems) were cited as reasons for considering these improvements.

Many theater managers have commented on the growing public awareness of sound quality, and managers of theatres equipped with surround speakers have often expressed the opinion that it would be good showmanship to make more effective use of the surround track in re-recording.

Drive-in Screen Brightness

Forty-eight percent of drive-in theatres thus far surveyed have screens in excess of 100 feet in width. Even with the most efficient optical and arclamp equipment, this trend to larger outdoor screens makes more compelling the problem of low drive-in theatre screen brightness.

Black-and-white prints shown in these theatres are. of course, the most pressing concern. Scenes employing low key photography are almost completely lost. Overall print density that may be acceptable to a conventional type theatre is too dark for good outdoor theatre presentation. Contrast inherent in color prints make this type of product somewhat less objectionable, but these also

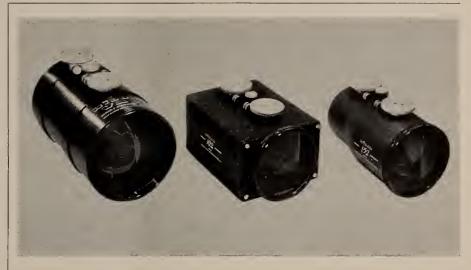
are too dark for good presentation in outdoor theatres using the conventional painted surface screens.

It is very apparent that it is of primary importance to adequately light significant action on the set or the scene will be lost on the screen. It is also apparent that printing density practices must take into consideration the requirements of outdoor theatre presentation.

Exhibitors' and projectionists' viewpoints on matters such as these are solicited by the Research Council.

Electronic Reading Machine

An electronic reading machine, powered by flashlight batteries, reads handwritten numbers as they are being written; could read letters too, says developer, Bell Telephone. Numbers (or letters) are written with a metal stylus around guide dots on unit's writing surface, displayed on lighted panel. Bell plans using reader, size of portable typewriter, to identify large quantities of written numerals in phone offices.



HILUX...world's finest variable anamorphic projection lenses

HILUX VAL HILUX 102 HILUX 152

Anamazingly precise variable anamorphic that gives non-vignetting performance with both 4'' (101.6mm) and $2\frac{25}{32}''$ (70.6mm) diameter prime lenses. Complete control up to 2X without shifting lens or projector.

A 1X to 2X variable anamorphic for all standard $2\frac{25}{3}$? (70.6mm) lenses. Specially designed for projection of wide screen and Cinemascope pictures with same prime lens. Non-vignetting light transmission.

A 1.5X to 2.0X variable anamorphic for all standard $2\frac{25}{3}$ " (70.6mm) projection lenses. 64mm free rear aperture assures maximum light with no vignetting.

PRIME PROJECTION LENSES

Nearly Half a Century
 of Precision
 Lens-Making

F:1.0 Light Collecting Speed Available in f/2.0, f/1.8 and NOW the NEW f/1.4

Ask us for a comparison in your own theatre! Write Dept. B-18



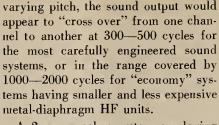
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LOUDSPEAKERS

(Continued from page 8)

this unit may be small and relatively inexpensive. Although cheap to manufacture, this type of 2-way system should not be used in any but the smallest theatres.

A crossover network employing an inductance ("sound choke") in addition to a capacitor performs an actual separation of the high and low frequencies into two electrically distinct channels. For a tone of continuously



A 2-way speaker system employing a crossover network is an electrically balanced system, a fact that must be kept in mind whenever speakers or amplifiers are replaced. The most efficient transfer of electrical energy takes place between matched impedances. This means that the impedance (the AC resistance expressed in ohms) of the amplifier output must be very nearly the same as the impedance of the speaker circuit.

Most loudspeakers have impedances of 5 to 25 ohms—the impedances of their voice coils. Since the internal resistance of the amplifier power tubes is very high (several thousand ohms) it is obvious that the speakers cannot be connected directly to the powertube output with good results. Accordingly, the power-tube plates are connected to a matching transformer having a primary (input) winding of several thousand ohms impedance and a secondary (output) winding of only 5-25 ohms impedance to match the speakers.

The impedance of the crossover network, itself, may be as high as 10 or 15 ohms. This must be added to the impedance of the amplifier matchingtransformer output. And since im-

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pedance varies somewhat with the frequency of the sound current, electrically mismatched components produce distortion as well as weak sound.

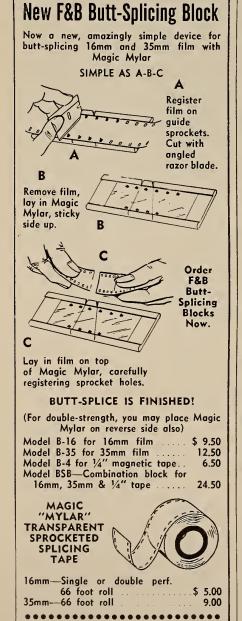
Similarly, the power-handling capacity of a speaker, measured in watts, must be at least as great as the maximum output of the amplifiers. To connect a 15-watt speaker to a 40-watt amplifier will produce the overload distortion previously described.

Multi-Speaker Units

The use of a large number of small cone-type dynamic speakers-several dozen 5- or 6-inch speakers for a theatre—obviates the need for a 2-way crossover network with woofers and tweeters. In fact, a speaker system of this kind powered by a matched amplifier is the simplest and cheapest way to get good sound for a small theatre. The components can usually be purchased at a discount, and any projectionist or hi-fi enthusiast having a good knowledge of sound electronics can build the baffle, mount the speakers, and wire the system. But are there any other advantages of a 1-way



ROBERT A. MITCHELL'S MANUAL OF PRACTICAL PROJECTION

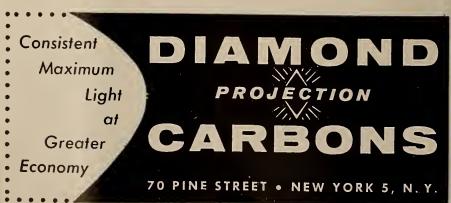


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speaker system of this type? And what are the disadvantages?

Theory indicates that a woofertweeter combination eliminates the Doppler effect and permits the use of a LF speaker sufficiently large to resonate at a subsonic, and therefore inaudible, frequency. An array of small dynamic speakers, like a single small speaker in a home radio, is prone to resonance in the audible range.

Also, a battery of dynamic speakers produces enough back radiation of sound to cause troublesome "back-wall slap" and interference effects unless the backstage area is acoustically deadened with properly placed velour draperies. The HF horns used with modern 2-way sound systems eliminate back radiation. But, on the other hand, the absence of directional horns (required for all metal-diaphragm HF speakers) provides more uniform sound distribution throughout large auditoriums and eliminates the resonance, rattles, and frequency distortion of horns of inadequate design, cheap construction, or incorrect placement.

It may be mentioned that even 2-way systems designed for the larger theatres have always utilized more than one speaker of each type. Two or more HF units have sometimes been used with a single LF speaker to insure good sound distribution; and in recent years nearly all manufacturers of sound equipment have offered a battery of two or more medium-size woofers in place of one large unit. The reason for this is largely a matter of economics, for low-frequency sound is practically non-directional.

No loudspeaker, whatever its type or size, can work satisfactorily as an isolated unit. This inescapable fact may be demonstrated by removing



from its cabinet the speaker of a radio set or phonograph. When the instrument is played with the still-connected speaker outside the cabinet, the sound is weak and very harsh and distorted. The cabinet acts not only as a director of sound waves, throwing them forward into the room, but, more important, as an acoustic load against which the speaker diaphragm may work.

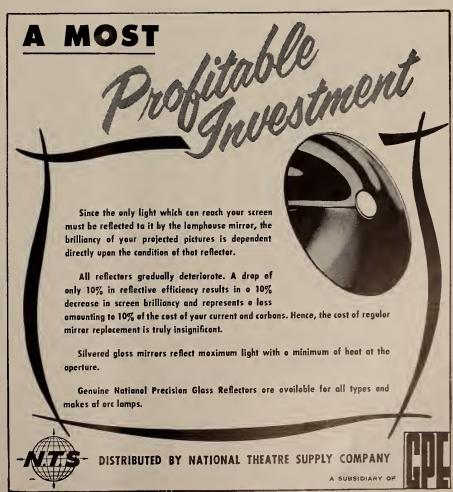
Horns and Baffles

To prevent a wild and aimless rattling of the diaphragm of a theatre speaker, therefore, a horn or baffle must be provided. Exponential horns are best for metal-diaphragm speakers. By providing the proper amount of acoustic load for the small diaphragm, an acoustic efficiency is obtained which is appreciably higher than that of a paper-cone speaker working under the most favorable conditions. Moreover, the horn, usually in the form of a multicellular trumpet consisting of several exponential horns, directs all of the sound forward and prevents back radiation.

Low-frequency cone-type speakers require a baffle-board for acoustic loading. A flat baffle having the speaker placed in a centrally located circular hole increases in effectiveness as its area is increased; and since the optimum size of a baffle is related to the wavelength of the lowest frequency of sound to be reproduced, flat baffles for wide-range sound systems should have a large area.

To conserve the space demanded by flat baffles, both "bass-reflex cabinets" and "folded horns" have come into favor. The bass-reflex cabinet is a heavy, ruggedly constructed wooden box having a hole of the correct size in its front panel to accommodate the speaker.

The secret of the bass-reflex cabinet is the action of the back panel and the opening in the front panel below the speaker in reinforcing the sound with the back-radiated waves. It is extremely important, therefore, that the wooden back panel of a bass-reflex cabinet be at least \(^3\fmu_1\)-inch thick, very rigid, lined with sound-absorbing felt, and fastened solidly with glue and a



greater number of screws than mere strength requirements would indicate as necessary.

An improperly designed or poorly constructed bass-reflex cabinet produces a severe deterioration of sound quality!

Folded-Horn Baffles

The folded-horn type of baffle is nowadays very popular for theatre sound systems. This is essentially a baffle "folded" in such a way that it reinforces and projects the sound in the manner of a crude exponential horn. It departs from the perfect exponential shape by having plane, instead of curved, surfaces; but the departure does not affect the quality of the low-frequency tones reproduced by its associated LF speaker.

There is nothing really new about the folded horn: it was used in acoustic phonographs many years before the invention of electric sound amplification.

The folded-horn baffle works extremely well when made of plywood at least 3/4 of an inch thick and rigidly constructed. Like the bass-reflex cabinet, the folded horn must be glued under pressure and additionally fastened with a large number of long screws. Vibration of any part of a folded horn will create distortion, and rattles caused by loose or "sprung" joins are very annoying and are difficult to locate and correct.

The HF speaker with its multicellular horn is ordinarily mounted on the top of the folded-horn cabinet. The mounting must be exceptionally solid to prevent rattles. Only the positioning of the HF horns need be changed to insure the best sound distribution and to reduce echoes and the effects

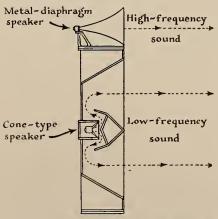


FIG. 6. Cross-section of a "folded horn" for low-frequency cone-type speakers.

of faulty acoustic phasing. The position of the LF units, once established, need not ever be changed.

The non-directional characteristics of the low sound frequencies make possible a decided economy in stere-ophonic sound installations. Three HF units are needed, but only one woofer unit, which is placed behind the middle of the screen. The three HF speakers for the center, right, and left stereophonic channels should have identical frequency-response characteristics.

Horn Positioning

It is desirable to position the HF horns in such a way that their sound-radiation axes do not cross in the auditorium, but meet at a point in the middle of the rear wall. If the beams of projected sound cross, patrons seated at one side of the auditorium receive excessive sound volume from the speaker behind the opposite side of the screen. This bad effect has been observed even at "showcase" presentations employing wide film and the most expensive equipment.

Single-channel optical tracks give especially pleasing results when played over all three of the stere-ophonic speaker channels in theatres having good acoustics. Multiple-channel reproduction of single-channel tracks permits a slightly lower volume at each individual speaker with a reduction of nonlinear distortion, and overcomes the "point-source" effect of a single speaker behind the middle of the screen.

Many observers consider this kind of reproduction superior to Cinema-Scope stereophonic sound for unobtrusive naturalness. The use of several channels simultaneously seems to project the apparent source of the sound closer to the audience.

Since only one amplifier of adequate power capacity is required, and only a matched set of three HF speakers need be obtained, even the smallest theatre can avail itself of the most natural sound. And when such a setup is reinforced by "surround" speakers in the auditorium for special-effect scenes and overture and intermission music played from disk records, appreciative audiences will repay the effort by continued patronage.

This is something to think about now that better pictures prove conclusively that things are beginning to "look up" for the exhibition industry.

MONTHLY CHAT

(Continued from page 3)

foyer, for the ultimate patron enjoyment.

"Let beautiful Exit Hostesses in Oriental pajamas bring us cups of tea as we recline on special chairs, slowly coming out of the film dream," he says. "Let them engage us in gentle conversation, let them ask us if we liked the bit where that fellow, not the fellow that loved her but the one she thought was dead, came up to that other fellow in the hotel with that girl, and she thought it was the other fellow."

That, I submit, is the kind of dialog that never takes place at home after Mr. and Mrs. Viewer have turned off "The Spider Woman Strikes Back" or "Frankenstein Meets the Wolf Man."

On the rare occasions when a quality film is shown, the viewer becomes so distracted and annoyed by the announcements in behalf of a shinier shoe polish, a quicker deodorant, a smoother shave . . . that it's hard to remember sometimes whether the fellow who really loved her was the one who thought she was dead or the one who married her.

In terms of television's health and soundness, it's a pity the Hollywood producers ever allowed any of their productions to be shown on TV. It has reduced movie attendance and taken the gloss and wonder off the little magic lantern at home.

We're all for toll-TV; having to pay for the aforementioned will surely kill all movie TV.

NATIONAL'S VENTARC

(Continued from page 18)

—the fact that direct radiation from the arc is practically eliminated by the surrounding reflectors, and that a complete change of air is made by blower every six seconds, the lamphouse is exceptionally cool in operation. Heat at the aperture is no greater than when burning an 8-mm copper-coated trim at 70 amps. without a heat filter. Water-cooling has been provided for the auxiliary reflector, and the positive and negative carbon heads. All these cooling agents must be operating before the lamp can be energized.

A separate manual control for positive striking of the arc in one easy motion and automatically positioning for proper gap is provided.

A new 220-volt, 3-phase selenium rectifier, designed as companion equipment for this "blown" arc, can be located at any distance from the lamp and the power adjusted remotely by means of a control on the lamp instrument panel. Overall, states the manufacturer, when operated at any given carbon burning rate, this lamp requires 15-20% less power than any other lamp when operated at the same burning rate.

Where we stand in the fight against CANCER ...and why your dollars are urgently needed now!

DECISIVE PROGRESS has been made in the fight against cancer in the last decade. Today one in every three persons who have cancer is saved. A few years ago it was only one in four.

Still more lives can be saved with what doctors know *now*, if all adults will have a health checkup every year. Many cancers are curable if discovered early and treated promptly.

The major hope for the future conquest of cancer lies in research. About twenty million Americans living today are marked for death from cancer unless research finds new means of curing the disease, or preventing its onset.

What new knowledge has been won to brighten cancer's darkness? High on the list is the discovery of chemicals which cause some cancers to shrink . . . and put victims of this disease back on their feet for a time. There are sound, scientific reasons to believe that more effective chemicals will come which may possibly *cure* one or more forms of cancer.

Equally remarkable are the advances in surgery for cancer...permitting wider removal of malignant growths with less risk to patients and far greater chances to control the disease.

The scoreboard of cancer progress also includes methods for treating some cancers with hormones, which prolong the active, useful lives of many patients...tests for early diagnosis of some common forms of cancer...development of X rays with power undreamed of 10 years ago...incredibly delicate techniques by which the living chemistry of a single body cell can be studied.

Immense new research projects are under way and might be expanded to answer such questions as:

Are the tiny organisms called viruses significant factors in the cause of cancer in man, as they are in some cancers in animals? Why do cancers grow rapidly in some patients, slowly in others? If some people are immune or more immune to cancer than others, how can that immunity be strengthened? What elements in our environment may be causing cancer?

Important findings must be moved from the laboratory table to the hospital bed. The step from test tube to patient is difficult, time-consuming and costly. As research goes forward, and new leads open up, more and more work will be done directly with patients with cancer. Thus, research costs will snowball as science continues to press towards its goal.

Your support of the American Cancer Society's Crusade has already brought significant gains in the control of cancer. More lie ahead . . . will you make them possible? Let your dollars work for you and for your children and for their children.

Send your check today to "Cancer," in care of your local post office.



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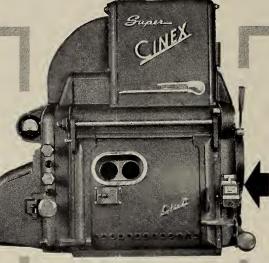
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Monthly Chat

Inanities, Inc.

THIS DEPARTMENT, usually devoted to technical matters, has been increasingly concerned of recent months with the economic status of the motion picture field as viewed from the exhibition (theatre) end. The steadily mounting suction of income from the exhibition field to the top echelons—executive, "star" actors and actresses, and distribution—rather than to a more even spread to all segments (which mama taught us made a good cake)—would be amazing to anybody but those of us who have become, after 30 years, inured to the inanities of this so-called industry. For example:

"STAR PAYMENTS: William Holden's thespian contribution to "The Bridge on the River Kwai" (definitely not the most important thereto) is based on a contract calling for a minimum base pay of \$250,000 OR 10% of the world-wide gross! The head of Columbia Pictures (the distributors) studio sees a total gross of more than \$20,000,000 for "Kwai," and therefore estimates Holden's "take" for this one job at \$2,000,000-plus.

Now, Holden did a creditable job in "Kwai;" but we can think of a couple of others who could have done as well or, possibly, a bit better—and for a FLAT sum approximating the salary of the President of the United States. This allocation of a pre-exhibition charge of at least \$2 million for one actor can only be construed in our mind as an economic blood-letting operation on every theatre in the world that plays this picture.

How many first- and subsequent-runs are required for this picture to pay for this *individual* effort? Answer: PLENTY. And Holden is only a symbol, one of a score of "stars" who get such deals.

THEATRE RENTALS. Thirty years ago an exhibitor could book a picture for X-dollars for so many days' showing. Since then we have seen rentals on a feature film grow from 20 to 90 per cent of the gross box-office income. And the distributor, not the exhibitor, reserves the right to, and invariably does, arbitrarily blue-pencil operating overhead, or "nut."

DAY AND DATE "BIG" BOOKINGS: Instead of getting together as do commonplace businesses devoid of "glamor," the producer-star-distributor ego demands that we release, within one week in one area, such potent box-office magnets as "Peyton Place," "Sayonara," ". . . Kwai," "Raintree County."

This inevitable dilution of the available weekly or bimonthly spending money of the average wage-earner, faced with the scare economic headlines rampant these days, would be apparent to any seventh-grader.

EXTENDED RUNS: Atop the foregoing, the distributors demand and get by virtue of picture shortages, a "milking" operation whereby any print they supply will run to consumerspending-money exhaustion.

Plow the dollar-ground under and let the dollar-boxoffice-ground lie fallow for weeks upon end thereafter.

Who is at fault for this state of affairs?

EVERYBODY—and this includes those in whom has been reposed the conduct of ALL phases of this business.

We leave it to the self-respecting instincts of those who have garnered the most in terms of dollars from this business to take steps to ensure that this once-great industry be not reduced to 100 first-run theatres, plus "art" theatres playing foreign-made films without benefit of Hollywood technicians, that those people who have contributed most to their affluence (we mean MONEY) shall not be reduced to a pitiful and therefore inarticulate and powerless minority.

The question posed here is-HOW SOON?-James J. Finn.

National Can Equip Your Theatre with Projection Lighting that Matches Your Specific Needs...

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Heat radiation to the projection baoth is held to a minimum by the Heat Purger, o heavy duty, quiet centrifugal exhaust fan which removes products of cambustion and heat.

Al- Nous

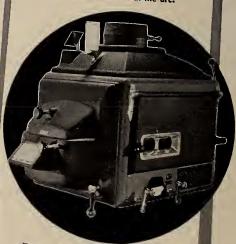
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70% more light than most 18-inch reflector lamps. 51% more light with 35 mm film and an f I.7 lens. Projects 65,000 lumens for Fox CinemaScope 55 mm (1.340 x 1.06); 56,000 lumens for MGM 65 mm and Todd-AO 70 mm; 55,000 lumens for CinemaScope 35 mm (.912 x .715) and 46,000 lumens for small aperture 35 mm (.825 x .600). A new and totally different type of lamp. Requires 15-20% less power than any other lamp at a given carbon burning rate. A 10 mm x 25" non-rotating Ultrex positive carbon is burned with a rotating 7/16" x 12" solid graphite negative at 140 to 160 amperes and 70 to 78 volts. The 21-inch reflectorthe largest ever used—is designed for all film widths.

NATIONAL EXCELITE "135" PROJECTION ARC LAMP

Outstanding and exclusive features built into bath the Canstellation "170" ond Excelite "135" include: Accommadation of full 20-inch corbon trim. Automatic crater positioning system which mointains the tip of the burning carbon of the exact facol paint of the reflectar. Change of light calar of the screen, caused by voriotian in carban burning rates, is obsolutely eliminated. Rear lomphause doar which swings campletely out of the way ta facilitate retrimming and lamphouse and reflectar cleoning. Single adjustment controls the feeds of both carbons. Simplified spot facusing. The entire burner assembly is movable so that the pasition of the arc can be shifted for the best screen light without disturbing the relative carban pasitions or equilibrium af the arc.



Burns 9, 10, 11 mm Regular and 10 mm Hitex Positives for all 35 mm systems.

NATIONAL THEATRE SUPPLY



Basic Screen - Light Terms

BETTER understanding of the application and operation of projector carbons with respect to brightness of light source and screen illumination may lie in a comprehension of the way light is measured and some of the terms in general use.

The terms "candle", "candlepower", "lumen", "foot-candle", and "foot-lambert" are conventionally employed as units of measurement of light. The following explanations are based on their application to motion picture projection.

Candle—a Fundamental

This is the fundamental unit of light intensity and is a measure of the ability of a source to radiate light. A source is said to have an intensity of one candle if it is capable of illuminating an object at a given distance to the same degree as would a standard candle. The standard candle was originally defined in terms of the open flame of a \%-inch sperm candle burning at a specified rate.

Later, a group of carbon filament lamps were preserved at the National Bureau of Standards. In 1948 these were replaced by a very accurate method based on the solidifying temperature of molten platinum.

Candlepower—Source Data

This is the light intensity of a source, expressed in "candles". Thus, it is proper to state that a particular carbon arc has a "candlepower" of 80,000 candles. Particularly with carbon arcs, which emit light in one hemisphere ahead of the crater, the light intensity (or candlepower) varies with the direction of view. It is therefore common to further specify the candlepower with respect to the direction, such as "horizontal candle-

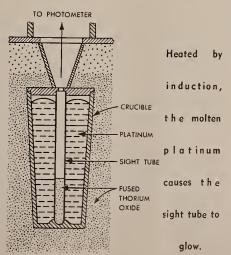
Through the years no single organization has been more co-operative with the projectionist craft than National Carbon Co. True, they pursued a commercial objective; but they also endeavored ceaselessly to serve the best interests of the art and the craft of projection—as is so hand-somely exemplified in the appended precise definitions, prepared by their engineering department, applicable to showing better motion pictures.

[Text and illustrations for the appended article are reprinted from Projector Carbon Bulletin No. 2, made available by National Carbon Company.]

power", "axial candlepower", "forward candlepower", etc. Candlepower values can be specified for any direction or angle from which the light source is viewed. Candlepower is the measure of the light-emitting power of a source, without regard to its area.

Brightness—Light Emission

Brightness is the measure of the lightemitting power of a source in relation to its area. It is expressed in "candles per unit area". Obviously, two sources can be of the same candlepower while differing in size. The smaller of the two



is then said to be "brighter". The square millimeter (0.00155 sq. in.) has been chosen as the unit area for expressing the brightness values of the carbon arcs described here. Candlepower (total lightemitting power of a source) and brightness (light-emitting power per unit of area), when measured in all directions, together comprise complete specification of a light source.

Lumen-Rate of Flow

A lumen is the measure of the rate at which light pulses are emitted or received. A lumen is the rate at which light is radiated from a source of one candlepower to an area of one square foot, so located that all points of the area are one foot from the source. If a source of one candlepower in all directions is enclosed at the center of a sphere of one foot radius, each square foot area of the sphere will receive light pulses at the rate of one lumen.

The lumen is thus a measure of *light* flow, just as, in electrical units, the ampere is a measure of the rate of current flow.

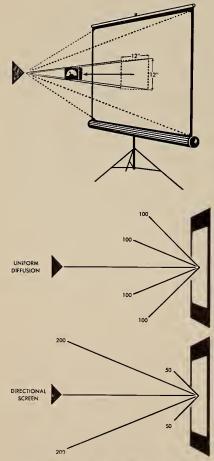
Foot-Candle—a Measurement

A foot-candle measures the rate at which light pulses fall on a surface of any area, all points of which are located



"Candlepower" is the light intensity of a

a distance of one foot from a source of one candlepower. If this surface is one square foot, it receives light pulses at the rate of one lumen. Thus, the illumi-



"Foot-Lambert" is the amount of light reflected.

nation in foot-candles, multiplied by the area in square feet of the object, gives the total lumens over that area.

Foot-Lambert-How Much?

This is the unit of "brightness" ordinarily used to define the amount of light per unit area *reflected* from the screen. A perfectly diffusing surface reflecting light at the rate of one lumen



A "Lumen" is the rate at which light is radiated.

per square foot is said to have a brightness of one foot-lambert in all directions.

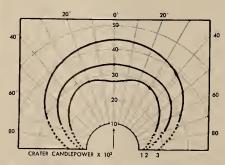
Overall Reflectivity

By which is meant the ratio of the total light reflected in *all* directions by the screen to that incident on the screen. This value will always be *less* than 100%.

Apparent Reflectivity

This is the ratio of the brightness in foot-lamberts to the intensity of the light delivered to the screen in foot-candles. For near-perfect diffusing surfaces (such as flat white screens) this value will approximate that of the overall reflectivity, expressed as a ratio of the same units. Directional screens, which concentrate the incident light within one viewing range, may have an apparent reflectivity of 200% or 300% in one direction and fall far below 100% in others.

"Foot-candles" and "lumens" are the units commonly used to express values of the projected (incident) light on motion picture screens. Screen light is frequently expressed in *incident lumens*—the total useful light output of the carbon are lamp and projector mechanism

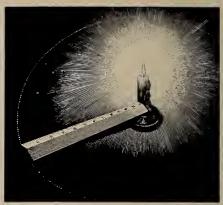


Arclight distribution in horizontal plane

1—9mm x 20" H.I. Projector Positive at 85 amperes.

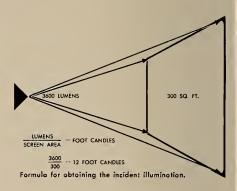
2—10mm x 20" H.I. Projector Positive at 105 amperes.

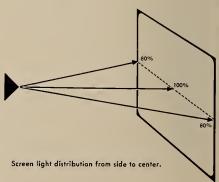
3—11mm x 20" H.I. Projector Positive at 120 amperes.



"Foot-Candle" is the rate at which light pulses fall on a surface.

To measure the screen lumens in any particular case, the screen may be divided into small areas of substantially uniform illumination, and the magnitude of the illumination (in foot-candles) measured in each area. The foot-candle values thus obtained, multiplied by the associated area in square feet, gives the total lumens for that area; and the sum of these lumens values for all the areas





gives the total screen lumens. Lightmeasuring devices calibrated to read directly in foot-candles are available for making such measurements.

Incident Illumination

The average incident illumination (in foot-candles) for any given size screen may be obtained by dividing the total lumens available from the projection system by the area of the screen in square feet. For example, if a system

delivers 3600 lumens to a screen 300 square feet in area, the average light intensity on the screen will be 3600 divided by 300 or 12 foot-candles. This is equivalent to 12 lumens per square foot.

In practice, the light is not distributed uniformly over the screen area in a manner indicated by the measurement of average illumination. To describe accurately the spread of available light over the screen, another concept is needed: "screen light distribution". Ordinarily this term is simply a ratio of the illumination near the edge of the screen, on a horizontal center line, to the illumination at the center. A screen light distribution of 80%, more precisely expressed as "the side-to-center distribution ratio", means that the side illumination is 80% of that in the center.

Certainly the most important factor to consider is the amount of light reflected from the screen to the observer. The amount of reflected light depends upon the initial character of the screen surface as well as its age and cleanliness. Information on the reflecting power of any given screen in its original condition can be obtained from the screen manufacturer.

Procedural Data

In the example given, the method of calculating the average intensity of the light delivered to the screen was shown, and an average value of 12 foot-candles or 12 lumens per square foot, was obtained. Assuming that we have a perfectly diffusing screen with a reflecting power of 75%, the "brightness" of the screen will be 75% of the incident light or 9 lumens per square foot which, by definition is, 9 foot-lamberts—the accepted unit of measurement for screen brightness.

Wherever the light intensity in footcandles and the reflecting power of the screen are known, the brightness of the screen in foot-lamberts can be determined by multiplying the two. By a similar process, the light intensity (in footcandles) necessary to obtain a given brightness (in foot-lamberts) is determined by dividing the foot-lambert value desired by the reflecting power of the screen.

Since a motion picture screen is ordinarily brightest at the center, the specification of brightness of a particular screen should include values not only for the center but for the sides and perhaps the corners as well.

The American Standards Association (Standard Z22.39—1953) specifies: "The brightness in the center of the screen for viewing 35-mm motion pictures in indoor theatres shall be 10^{+4}_{-1} footlamberts when the projector is running

with no film in the gate".

In other words, the brightness in the center of the screen should be within the range of 9 to 14 foot-lamberts. For a perfectly diffusing screen of 75% reflecting power, the incident light to meet these conditions should be within the range of from 12 to 18.7 foot-candles.

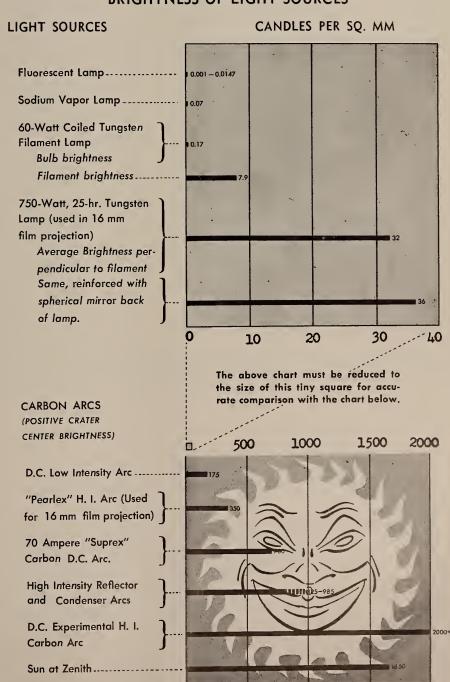
Color Projection

When color film is being projected, another problem is added to that of obtaining recommended levels of screen brightness—the accuracy of color reproduction on the screen. The constantly

growing production of color features is matched by the critical attitude of theatre patrons toward accuracy of color reproduction. The audience sees on the motion picture screen only those colors that are present in the projection light and which remain after others are absorbed by the color film. If certain colors are absent from the light, the film cannot put them on the screen; the film can only absorb or transmit the colors that are in the light behind it. Also, any excess of certain colors in the light source distorts the natural hues of color pictures. High-intensity carbon are pro-

(Continued on page 26)

BRIGHTNESS OF LIGHT SOURCES



Projection Requisites At Drive-Ins

By ROBERT A. MITCHELL

Here is a wholly new approach to the presentation of motion pictures at drive-in theatres — equipment, testing, and the actual picture projection, joined with a series of suggestions for overall improvement that should win projectionists new widespread respect.

OVIES are movies whether shown out-of-doors or in; and if shown out-of-doors, they are expected by the audience to be as dramatically effective as when shown anywhere else. This expectation cannot always be completely fulfilled in drive-in projection any more than it can in the presentation of theatre films over TV; the necessary glamor of the theatre is absent.

But be that as it may, the public expects to encounter at least a modicum of true theatrical flavor in the way professional movies are presented in drive-ins, even though they are well aware that TV showings even of memorable old films are no more "glamorous" than they would be if viewed on a moviola.

Even the smallest and most unpretentious of drive-ins—a mere parking lot behind a hot-dog stand in a cow pasture—must not be considered exempt from this important consideration, for when the lights go out and the screen comes to life with a photoplay, the mysterious magic of bigscreen movies erases all boundaries of time and space and creates new worlds of mood and feeling. There are no exceptions to any rule of good showmanship!

Good Projection Top Requisite

Lacking elaborate stage (or, rather, screen-area) effect lighting to substitute for curtains (which are out of the question in a drive-in) and without powerful effect projectors to provide pleasing theatrical effects of mobile color during the pre-show and concession-break intervals, very little can be done to supply even a suggestion of theatrical glamor. But however trifling the end result of efforts in this direction may seem by itself, drive-in patrons are certain to respond appreciatively.

All efforts to "glamorize" a motionpicture presentation with theatrical effects go for nothing if the quality of the projection is less than acceptable. Projection quality poses a serious problem in many drive-ins because of the adverse effect upon the sound reproduction of undersize, and often inferior, in-car loudspeakers, and because of the difficulty of adequately illuminating tremendously large screens.

Screen-Brightness Level

The use of drive-in screens exceeding 60 or 70 feet in width makes it impossible to attain a screen-brightness level of even 4 foot-lamberts (measured without film, but with the projector shutter running). The minimum acceptable brightness for indoor screens is 9 foot-lamberts, a level which only the smallest drive-ins are able to attain.

Low-amperage "simplified" highintensity arclamps are contraindicated for drive-ins because of their relatively low light output. Acceptable screen illumination can be obtained only with the higher powered H-I lamps having rotating positives. The most powerful modern reflector lamps employing 13.6mm carbons furnish from 20,000 to about 35,000 screen lumens (measured without the shutter running) depending upon the arc current employed, the effect of positive-carbon cooling, and the optical speed of the mirror and projection lenses. A revolutionary new lamp announced by Strong, called the Jetarc, is said to deliver 45,000-

Projection Precept

Suppose that you are using 3.75-inch lenses for regular projection at an aspect ratio of 1.85/1, and you wish your CinemaScope pictures to have the same height of image. The CinemaScope prime lenses should therefore have a focal length of $3.75 \times 1.604 = 6.02$ inches (= 6 inches for practical purposes).

50,000 lumens when burning 10-mm Ultrex carbons under the special conditions first utilized in the Gretner Ventarc designed for the eidophore system of television projection.

For the sake of standardization, it is advisable to measure projector lumen-output with regular 0.825" x 0.600" apertures and with the projection lens used for non-anamorphic projection, either standard or widescreen. Heat filters are necessary when the arc current exceeds 75 or 80 amperes unless the new dichroic heattransmitting reflectors are used. These are now furnished with such high-powered lamps as the Aschraft Super Cinex, the Strong Super 135 and U-H-I lamps, the National Constellation, and, of course, the new Strong Jetarc.

Measuring Light-Flux

The light-flux, or lumen, output of projectors (often called "screen lumens") is measured with the projector shutter running because the light intercepted and wasted by the shutter contributes nothing to picture illumination. The output lumens specified by lamp manufacturers, however, represent projector lumens measured without the shutter. This procedure is necessary because the shutters of different projectors transmit different percentages of the total light. For a rough estimate of the actual screen lumens obtainable with a specific make and model of lamp, divide the lamp manufacturer's lumen rating by 2.

Projector light output is one thing; actual picture brightness is another. Although no screen can reflect more light than it receives (drive-in screen reflectivities range from 70 to 95 per cent), it is possible, by using modern "lenticulated" screen panels of specially treated aluminum, to concentrate most of the light into the parking area occupied by the audience. Apparent screen brightness may thus be increased to levels far greater than the maximum obtainable with the best

What clicks at the box office?



JAMES GARNER, starring in DARBY'S RANGERS. A Warner Bros. Production.





"NATIONAL" CARBON ARC brightest man-made light!

bring out exciting realism!

"National" carbon arcs match the sun's color balance. That means your audience can enjoy all the realism Hollywood puts on film. Deep colors come to life. Wide, wide screens show sharpness in every detail. For drive-ins, life-like images travel hundreds of feet. Indoors, picture brightness permits adequate house lighting.

These slower burning "National" Projector Carbons help cut operating costs: "Suprex" 7mm, 8mm, and 9mm carbons—10mm, 11mm and 13.6mm High Intensity Carbons.

The terms "National", "Suprex" and "Union Carbide" are trade-marks of Union Carbide Corporation

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UNION

MOST POWERFUL LAMP OF ALL TIME

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Brings Indoor Theatre

Quality Projection

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Drive-In Screens

DELIVERS DOUBLE THE LIGHT

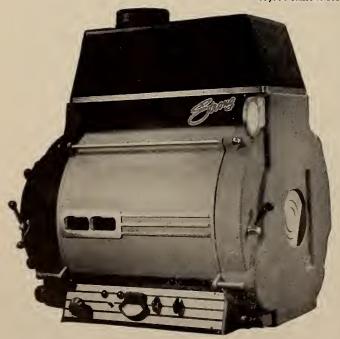
projected by any $16\frac{1}{2}$ " reflector lamp, and 51% more light than any lamp using a f1.7/f1.8 lens.

PROJECTS ALL FILM WIDTHS BY ANY PROCESS WITHOUT CHANGE OF REFLECTORS

The main mirror, an integral part of the rear door, is of the cold glass type, 21 inches in diameter—the largest ever put into regular production. It has a 61/4" focal length and 41-inch working distance. Aperture spot size is changed by a convenient control which shifts the position of the main reflector. The position of the burner need never be changed.

DELIVERS 65,000 LUMENS

for Fox CinemaScope 55 mm (1.340 x 1.06); 56,000 lumens for MGM 65 mm and Todd-AO 70 mm; 55,000 lumens for CinemaScope 35 mm (.912 x .715); and 46,000 lumens for small aperture (.825 x .600) 35 mm.



For further details write

A TOTALLY DIFFERENT SYSTEM!

Light reflected to the screen by conventional type lamps is picked up solely from the flat, disc-like face of the arc by a single mirror. Since brilliance increases as an arc is constricted, air jets supplied by an integrated blower, have been arranged in concentric circles around the positive carbon and directed toward its burning end. The resulting THREE DIMENSIONAL, cylindrical shaped light source increases the available pickup angle to more than 260°. Since the conventional reflector pickup angle is only 160°, an auxiliary 4-inch spherical reflector, is located behind the positive carbon to reimage this increased availability of light to the main mirror where it is combined with the light from the crater. A 10 mm x 25" non-rotating Ultrex positive and rotating 7/16" x 12" solid Graphite negative burn at 140 to 160 amperes and 70 to 78 volts. A 10 mm x 25" Hitex positive may be burned at 125 to 140 amperes. Aperture heat is no greater than when burning an 8 mm copper coated trim at 70 amperes without a heat filter.

The companion 220 volt, three-phase selenium rectifier can be located at any distance from the lamp and the power controlled remotely from the lamp instrument panel. Heat generated by rectifiers need no longer build up in the projection room.

THE STRONG ELECTRIC CORPORATION

31 CITY PARK AVENUE

TOLEDO 1, ONIO

Appreciation!

We are most happy to tell you that our Group Service Division is most enthusiastic about Robert A. Mitchell's Manual of Practical Projection, and we will certainly add it to our collection of fine books comprising our arts and science section.

MARY E. EARLE
Akron (Ohio) Public Library
See back cover.

smooth white surfaces.

Lenticulated, or surface-embossed, screens of high reflectivity have the extra advantage of minimizing the effects of extraneous illumination from the sky. Viewed at dusk, before projection begins, such a screen surface looks darker than a white screen. This is as it should be: the function of a directional screen is to direct to the viewing area only the light coming to it from the projectors.

"Skylight" Interference

The problem of skylight is especially troublesome above north latitude 40° during the late spring and early summer months. The sun sets at about half past seven in the northern United States at this season of the year, and bright twilight persists for a couple hours thereafter, presenting an obstacle to early starting of the show.

A shadow-box construction of the screen tower has been considered, but the most recent tests indicate almost conclusively that wings and alcoves large enough to shield the screen from the sky interfere seriously with audience sight-lines. Viewing angles from the ends of the ramps are often as great as 50°.

We can do no more than suggest lenticular screens of special design as the best defense against spill light from the sky. Their effectiveness may be just great enough to permit projection to begin about half an hour earlier than when plain white screens are used out-of-doors.

Much depends upon the orientation of the screen, of course; and proposed new drive-ins should be oriented so that the screen faces the east or southeast, never the west or northwest. The picture is imperceptibly faint when the show starts in many west-facing drive-ins, come June and July, as it is usually impracticable to start the show later than 8:30 P.M.

The magnitude of the twilight problem is suggested by comparing the brightness of the projected-picture highlights on the average drive-in screen (less than one foot-lambert) with the brightness of direct sunlight (12,500 foot-lamberts, more or less, depending on the time of day). The average brightness of full moonlight is only about 0.025 of a foot-lambert, a brightness too low to interfere with projection even when the screen is exposed to direct moonlight. Early-evening twilight may be hundreds, or even thousands, of times brighter than direct moonlight.

Optical Efficiency Factors

The optical efficiency of drive-in projection equipment has a tremendously important bearing on the brightness and clarity of the pictures. Not only should the most powerful lamps be used, but also the fastest coated lenses. Fast lenses require the use of modern projector mechanisms because, of course, many of the older machines either cannot accept lenses of large diameter or pass wide light beams without obstruction and consequent vignetting.

Film-flutter and depth-of-focus factors militate against the use of lenses faster than f/2.0 or f/1.9 in conventional theatres where the sharpest images are desired, but lens speeds of f/1.7—f/1.5 provide the brightest pictures with modern high-speed arclamps. For the best results, the focal length of the lenses for non-anamorphic projection should not be shorter than $3\frac{1}{2}$ inches or longer than $4\frac{1}{2}$ inches. The exact E.F. (equivalent focus) required depends upon the length of the projection throw and the size of picture wanted.

The Air Force, No Less

Manual of Practical Projection, by Robert A. Mitchell, has aided us immeasurably in clearing up a number of perplexing operating problems. This is due in no small measure to the fact that it is so very easy to read and, therefore, comprehensible.

S/Sgt. Frank N. Myers

U.S. Air Force

Motion Picture Branch
The Pentagon,

Washington, D. C.

See back cover.

The U.S. Army, Too

A few words anent Robert A. Mitchell's "Manual of Practical Projection":

We find it . . . full of information that will be valuable not only to projectionists but to all others interested in the motion picture art—as might be expected from the excellent articles that Mr. Mitchell has written for IP.

W. D. SHEPARD

U. S. Army

Motion Picture Service

See back cover.

The "backing," or "prime" lenses for CinemaScope have a focal length somewhat longer than that of the lenses for regular projection. When the E.F. of the lenses for non-anamorphic projection is known, the E.F. for Cinema-Scope prime lenses which gives the same picture height on the screen may be calculated from the following:

Non-Anamorphic	REQUIRED E.F. OF
ASPECT RATIO	LENS FOR CINEMASCOPE
1.375/1	1.192 x non-anam. E.F.
1.66/1	1.439 x non-anam. E.F.
1.75/1	1.517 x non-anam. E.F.
1.85/1	1.605 x non-anam. E.F.

As an example, suppose that you are using 3.75-inch lenses for regular projection at an aspect ratio of 1.85/1, and you wish your CinemaScope pictures to have the same height of image. The CinemaScope prime lenses should therefore have a focal length of 3.75 x 1.605 = 6.02 inches (= 6 inches for practical purposes).

New Intermittent Ups Light

The brightness of the picture can be increased by a factor of approximately 1.3 times by using the new rapid-pulldown (5-to-1) intermittent movements with shutter blades about 60° in angular width. Since 5:1 intermittents are made at the present time only for one make and model of mechanism, this expedient is not applicable to the large majority of drive-ins.

Careful inspection and expert maintenance of the projection and sound equipment is as important in a drive-in as in a regular theatre.* And it is only when the equipment has been properly installed and meticulously maintained that those "extras" of

^{*}An inspection routine was outlined in "Drive-in Projection: a Challenge," p. 10, et seq., of IP for May, 1957.

projection showmanship which add glamor to the screen presentations may be advantageously considered.

The wide gulf in quality and atmosphere between drive-in and conventional-theatre film presentation can never be completely bridged, but there exist a few areas of operational procedure that permit at least a semblance of "good theatre" in opening the show and providing for the concession breaks.

Tower "Floods" an Eyesore

Consider, first of all, the usual method of lighting the parking areaglaring, unshaded floodlights placed on the top of the screen tower. The lights usually shine directly into the eyes of patrons before the show and during intermissions. The screen, a blank white, is as bleak as an unused billboard; and the overall psychological effect, considered from a theatrical point of view, is bad. Seen for what it really is in the bare essentials of its physical structure, the screen is completely robbed of the air of mystery and glamor it possesses when concealed from view by curtains.

We cannot use curtains in a drive-in, but we can modify the ramp-area illumination facilities as the first all-important step in providing a *substitute* for the conventional curtains.

The parking area should be illuminated by floodlight towers erected upon, or near, the projection building. If the throw is so short that a large number of ramps exist behind the projection building, then illumination towers at the very rear of the viewing area provide the logical solution to the lighting problem.

These lights should be high and shaded in such a way as to prevent their direct rays from falling upon the screen. The intensity of the general parking-area illumination need not be as great as is often thought to be necessary; and in large drive-ins it may be augmented by extra lighting towers along the sides.

Color-Lighting the Screen

With the general lighting removed from the audience-facing screen tower, and with the screen surface kept reasonably dark when the parking area is illuminated, the means for decoratively color-lighting the screen may then be planned and installed. It is only necessary to replace the old

screen-tower floodlights with a battery of color floods directed down upon the screen surface and shaded by metal shields in such a way that relatively narrow, but slightly overlapping, beams are thrown down upon the screen itself.

Six is the minimum number of tower lights of this type which will give the most glowing color effects. These should be fitted with glass theatrical filters in light-tight metal boxes. The suggested colors are primary red, green, and blue, twice repeated in that order:

R, G, B, R, G, B,

to provide the proper mixture colors where the beams overlap. An array of brilliant, gradually merged hues is thus produced in each overlap areascarlet, orange, yellow, and chartreuse in the regions jointly illuminated by the red and green beams; aquamarine, turquoise, and azure in the green-blue overlap; and indigo, violet, purple, and magenta in the blue-red overlap.

Another spectacular arrangement of six lights duplicates the rainbow spectrum, the filter colors being, in order, red, orange, yellow, green, blue, and violet. The rainbow effect is most pleasing when produced symmetrically with twelve lights, the last six reversing the order of the first six:

V, B, G, Y, O, R, R, O, Y, G, B, V.

When just the three primary colors are used, the precise hue of each filter is a matter of critical importance. The

(Continued on page 23)

Strong Electric's "Light Caravan" Tours U. S.

Indicative of supreme confidence in its own product as well as in the essential soundness of the motion picture exhibition field is the Strong Electric Corp. sponsorship of a 60-day tour, now well into its second month, by a Light Caravan which will exploit the new Strong "blown" arc. Details of this development appeared in these pages last month.

The Light Caravan is comprised of a large truck which is fully equipped as an ultra-modern mobile projection room. Manned by an all-IA projection staff, headed by Ray Shuff of Local 228, Toledo, Ohio, assisted by Strong engineers, the Caravan's tour embraces 26 key film centers in the United States and its audiences comprise exhibitors, dealers, projectionists and newspaper men.

Mobile Projection Room

Caravan equipment includes a motion picture projector, the new "blown" arclamp, complete power conversion transformers, rectifiers and a water-cooling

Showings are given at drive-in theatres, the site selected being, wherever possible, those with the largest screens and thus the most exacting light requirements. By means of split-aperture tests there is obtained the most direct and exacting comparison between the "blown" arc and the drive-in's installed equipment. Identical film prints are used on both equipments.

Strong engineers report that the tour demonstrated conclusively the ability of the "blown" arc to deliver up to 65,000 lumens, with even light distribution over the entire screen area, plus depth, detail and sparkle.

Unexpectedly the "blown" arc has been revealed to serve another pressing exhibition need because its tremendous light output enables drive-ins to open at least a half hour earlier and not have to await complete darkness.

STRONG ELECTRIC

"Caravan of Light" gets underway. Left to right: Ray Shuff, IA projectionist; Harold Brown, sales manager, and Arthur Hatch, president of Strong Electric.



New Micronic Light Control For Super Cinex Arclamp

By CLARENCE S. ASHCRAFT

Ashcraft Manufacturing Company

Details of a new projection arclamp adjunct which utilizes and controls light, not heat, so as to render maximum operating efficiency.

THE Micronic light control is a precise device for exact maintenance of the carbon crater, the source of light, at a predetermined position from the elliptical reflector used in the Ashcraft Super Cinex projection lamp. It maintains the level and the distribution of light over the screen surface with unvarying accuracy, yet the values may be changed immediately by the projectionist.

The electric arc has heretofore been a somewhat erratic light source for motion picture projection, varying in intensity and color from minute to minute, because of the lack of a precise control.

The thermostatic method of light control which has been used for years for the control of searchlight arcs, and from time to time applied to motion picture projection lamps, is not wholly satisfactory because the image of the arc necessarily had to be reduced to about one-half its actual size to create sufficient heat to operate the bimetal leaves of the thermostat which operated the controls. The basic fault of the thermostat as a controlling means is that the periods of heating and cooling created "cycling" which resulted in periodic changes in picture brightness and color.

Controls Light, Not Heat

The Micronic control employs no thermostats. It controls light, not heat, therefore it uses light as a medium for its operation but in a way entirely different from any previous method. When 70-mm wide film projectors were introduced, which were also convertible for 35-mm film projection, the Super Cinex lamp was designed so that either 35-mm or 70-mm film projection was possible with equal efficiency

To eliminate the necessity for use of light-expanding or contracting lenses, sometimes referred to as relay lenses, which create a substantial light loss. an entirely new method was developed

whereby the angles of the light beam or cone of light from reflector to aperture could be varied to more perfectly cover the film area of either 35- or 70-mm film with equal efficiency. This new method involved reducing the distance from the large elliptical reflector to the film plane, or aperture, far more than had ever been attempted. The result was that not only was the light coverage over the film area made optimum but the projected light was vastly increased.

All existing theories regarding magnification and optical speed which determine efficiency were disregarded, and new and sound optical principles applying to motion picture projection were applied. The result was that it was possible to vary the size of the intense filmcovering light circle from approximately 1½ inch in diameter necessary for 35mm film to approximately 33/4 inches for 70-mm film by moving the carbon crater (the light source) only 0.237 (7/32 inch). This means that the area of the light circle is multiplied six times by a movement of the arc crater toward the reflector of less than 1/4 inch.

Simultaneous with this light area increase was an increase in projected light efficiency of over 25%. The rapid



Ashcraft Micronic detector unit.

expansion of the light beam with a very small movement of the carbon crater forms the basic principle of the Micronic light control.

Micronic Control Operation

Extending into the rapidly expanding light cone of the Super Cinex lamp, close to its perimeter at the front of the lamphousing and as near the aperture or film plane as is possible and practical, is a small plane reflector which deflects a light beam at right angles to the optical axis of the main reflector and projection lens onto a small screen 5% inch in diameter. In this screen is a narrow slit through which is projected the full intensity of the reflected beam onto the light detector unit.

Only a small amount of the total light reflected by the small auxiliary mirror is required for the operation of the controlling unit. The diameter of the aperture in the detector unit scanner is only 0.0040 inch.

The image of the light source which is projected onto the detector screen is six times as large and moves six times as fast as the light source itself. This indicates the increased precision of the Micronic method over the thermostatic system. In the latter the movement of the controlling image is one-half as fast as the light source movement. Since the Micronic image moves twelve times as fast as that used with thermostatic devices, the former is twelve times as accurate.

Sequence of Operation

A simple analogy to the operation of the Micronic control is the functioning of the nervous system and brain of the human body. If a hot object comes into contact with the human hand, there is an immediate transmission through the nerves to the brain which results in a rapid and involuntary withdrawal of the hand from the hot object. If a person is aware that an object might be heated beyond the point where it is comfortable to grasp, he tests by repeatedly touching the object with the fingers lightly; in this manner through the nervous system and the brain we determine what should be done about it, whether to keep our hands off of it or otherwise.

The analogy of the heated object, hand, nerves, and human brain and the sequence of action have been applied, in principle, to the Micronic Control: the action and sequence is similar to that of the deflected light beam, detector unit, analyzer and actuator of the Micronic system.

The position and intensity of the light beam projected onto the screen of the detector unit is checked eight times per minute, or every 7½ seconds, by the Micronic detector. This information is immediately transmitted to the Micronic analyzer which determines if the light source is in the exact correct predetermined position relative to the reflector, or whether a slight change is necessary; it also determines in which direction the change should be made, toward or away from the reflector.

This information is in turn transmitted to the Micronic actuator which controls the rate of forward movement of the positive carbon where at its forward end, facing the reflector, the crater (light source) is located. If the crater position is exactly correct, the actuator makes no correction; but if a slight movement in either direction is necessary, the actuator acts accordingly with unfailing accuracy. The result is a projected light of uniform intensity and color, the degree of which is immediately controllable by means of a slight movement, in either direction, of the detector scanning plate in the center of which the small light entrance hole is located.

One might assume that to obtain these results the mechanism must necessarily be extremely complicated and subject to the possible failure of some one or other of its components. This is not true by any means. Simplicity and the complete elimination of any questionable units guided the Micronic design.

Location of Control Units

The component units of the Micronic control are: (1) the plane beam reflector and adjustable mounting base and frame; (2) the detector unit mounting frame including the image screen, and (3) the actuating case enclosing timer unit operating rectifier and relay.

The light beam deflecting mirror and

maintaining frame is bolted to the inside of the front of the lamphouse with the mirror extending to the edge of the cone of light from the main 18-inch reflector to the aperture. The deflecting reflector, approximately 3/4 inch square, is mounted on a heavy frame adjustable to the correct distance into the light cone and also adjustably swivel-mounted so that the deflected beam may be directed to the exact required position on the small detector screen.

Due to the heavy construction and the fact that the frame is located in the air stream which blows over the reflector surface, heat has no effect, which might alter the direction of the deflector light beam once it is adjusted and secured. The highly magnified, deflected light beam is adjusted at the factory so that the image extends to a center line marked on the detector screen.

Detector and Analyzer

This small unit is located on the front of the operating side of the lamphouse, in the most convenient position. On the rear of this unit is the scanning plate from which extends upward a movable arm and indicating pointer the position of which relative to the image center line is shown on a graduated scale. The scanning plate indicator, in the center position of the scale, places the small light entrance hole on the center line of the image screen.

The detector unit is located directly behind and close to the scanning plate. The analyzing unit is located in the same case as the detector unit. The case is hinged in order that it may be swung to the right to expose the image screen. If the image of the light source moves a minute distance either side of the indicator line on the screen, there occurs

an immediate change in the electric current which operates the analyzer.

For instance, if the image lags to the left of the indicator line, no matter how slightly, the current is decreased rapidly and opens the analyzer contacts which in turn open the contacts of the actuator unit, resulting in a speeding up of the control motor which moves the light source toward the reflector.

These slight distances are a matter of thousands of an inch. Since the control motor is at all times moving the positive carbon forward, the periods of speeding up or slowing down of the motor are short and therefore do not have a "cycling" effect which might make a noticeable change in screen light or color.

Conversely, any attempt of the detector screen image to crawl ahead of the line is immediately counteracted by the closing of the analyzer contacts, thus decreasing the motor speed. In this manner the image cannot move away from the line; since the image is six times the size of the light source the latter is maintained within a very few thousandths of its correct position.

On the front plate of the detector and analyzer unit is a signal lamp which indicates, when lighted, the periods of increasing motor speed. When the motor speed is not increasing, there will always be ½-second flashes every 7½ seconds. Motor speed-up periods may be up to 5 seconds or longer depending upon the requirements of the arc.

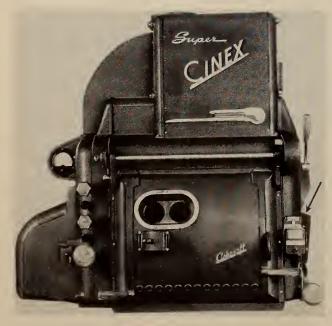
The Actuator Unit

The actuator unit, which needs no observation by the projectionist, is located on the left side of the lamphouse at the rear. It contains the small fullwave diode rectifier which is connected to 115 volts AC and has an output voltage of 6 volts DC for the operation of the various units requiring that voltage. The timing device which detects any required light source position change every $7\frac{1}{2}$ seconds and is operated by a Telechron motor is also mounted in this case, as is the small relay which alters the control motor speed. This relay is operated by the opening or closing of the analyzer contacts.

The negative carbon used in the Ashcraft Super Cinex lamp has a normal burning rate of 2½ inches per hour and its forward motion is uniform. So slow is its burning rate that only two oscillations per minute of the feeding clutch are required. Since the rate of consumption is uniform, the most dependable source of power is a small synchronous motor operating on 115 volts AC.

The oscillation of the clutch is accomplished by the rotation of two ball-

(Continued on page 26)



Shown here is the complete lamphouse with the Micronite unit attached. Arrow points to location of unit.

Projection CLINIC

Optical "Basics" for Projectionists

O LONGER is it a mere assumption that the world needs not so much to be told as to be reminded; it's a fact. Tricks there are to all trades, true, but only a sound basic knowledge not only of the "what" but the "why" is essential to the seasoned craftsman. Here, then, are a few optical "basics" for the professional projectionist.

SPHERICAL ABERRATION: In an uncorrected objective lens system, the rays from the center of the object which pass near the edge of the lens are bent more sharply than those passing near the center of the lens, and in consequence are brought to focus at a point nearer the lens itself. If the center of the object is a bright point of light its image appears as a similar point but surrounded with a blurred circle.

COMA: This is similar to spherical aberration, but of a non-symmetrical character affecting images of points not at the center of the object. The blur of each image point in this case is not a circle but a tail like a comet (hence the name) extending toward or away from the center of the image.

ASTIGMATISM: Astigmatism, like coma, affects only the images of points off the optical axis. It is the tendency to image the object point as two short lines, mutually perpendicular and longitudinally displaced from each other. Between these two lines lies an "image," or blur pattern of minimum size.

Flat Object on Curved Field

CURVATURE OF FIELD: In the simple case, curvature of field occurs when a flat object is imaged on a curved surface, usually concave with respect to the lens. Sometimes this aberration can be overcome by curving the object itself, as in the case of the curved slit used in sound reproduction, or the curved surface of a television tube. Curvature of field is usually accompanied by astigmatic differences

DISTORTION: Distortion occurs when the magnification of the system is not uniform across the entire image. If regions near the edge of the object are magnified more than those near the center, "cushion" distortion is present, so called from the appearance of the image of a square or rectangle. If the reverse be true the phenomenon is called "barrel" distortion.

Optical systems generally suffer, to a greater or lesser extent, from all these aberrations in combination, plus color aberration in the case of white-light illumination. The problem of the optical designer is to reduce them to a minimum, and how well he has succeeded is evident in the really excellent lenses available today to the motion picture theatre field.

"Normal" Framing Position

IT MAY seem desirable to keep the framing knobs or handles of the projectors close to their midway positions at all times to provide equal framing latitude in both the "up" and "down" directions, but there is real danger in this practice.

Use Frame Knob Frequently

The teeth of an intermittent sprocket wear unevenly when the position of the framing knob is never changed. The wear and tear of film-pulldown affects some teeth more than others. Since the maximum amount of tooth wear occurs during the acceleration period (when the velocity of the sprocket is increasing), the teeth that perform the actual pulldown operation are worn the most and, conversely, the teeth that come into action during the deceleration period are worn the least.

Just "Special Attractions"?

According to an unidentified spokesman for a large booking outfit in the Middle West, theatres should present only "special attractions" at special prices, and leave the ordinary "small" movie to TV. The plan is to show some 30-50 blockbusters a year at variable rates, and for variable lengths of time, anywhere from four days to four weeks.

Also suggested was that the blockbusters—of which there will be an increase this year—will require special handling, and "it is necessary to advertise nationally and locally 'this picture will never be seen on your TV screen.'"

If the framing knob is never changed, every fourth tooth on each flange of the intermittent sprocket is worn down excessively, resulting in tooth irregularities that cause more or less severe 6-cycle picture dancing whenever an accidental misframe requires the projectionist to turn the knob to a new framing position.

Only projectors having rotating framing (Simplex, Century, RCA Brenkert, DeVry, Ernemann, Philips, etc.) are subject to this trouble. It never occurs with mechanisms in which framing is accomplished by moving the entire intermittent unit up and down (Motiograph and Powers).

To prevent 6-cycle picture jump caused by unevenly worn sprocket teeth in rotating-framer mechanisms, change the framing adjustment to a new position at least once a week.

Magnetic Head Wear

While with optical sound the scanning of the sound track is performed by a ray of light, the sound track of the magnetic sound recorder runs over the magnet heads, produce a certain frictioning which, in turn, wears out the magnet heads. The amount of wear and tear depends on the hardness and other properties of the magnetic sound track and it is, therefore, impossible to give exact data about the life of a magnet head.

Magnetic Head Inspection

For this reason the magnet heads should be examined from time to time in order to establish the amount of wear and tear. If the heads are worn down excessively, the image portion of the film will be impaired and show traces of abrasion. This is particularly important when the film is, as usual, slightly arched.

It is recommended to make regular tests with strips of raw-film without a magnetic sound track but which are also slightly arched. If the wear and tear on the magnet head is too great, traces of abrasion will be seen on the raw-film and it will be necessary to exchange the magnet head for a new one.

Loudspeaker Damage

NEVER PLAY sound over electromagnetic speakers unless the field coils are energized! To use the speakers with their fields turned off may result in burning out the delicate voice coils.

Modern "PM" speakers are never endangered in this way because they have alnico magnets to provide a permanent magnetic field.

In The

SPOTLIGHT

The function of this department is to provide a forum for the exchange of news and views relative to individual and group activities by members of the organized projectionist craft and its affiliates. Contributions relative to technical and social phases of craft activity are invited.

ATEST entry in the "New Look" sweepstakes relative to the modern manner of motion picture projection is the Cinemiracle process which had its dual premiere in New York and in Los Angeles the early part of this month. This system, which involves three negative films, three positive prints, and three projectors for its presentation, was described in IP for March 1957 (p. 16).

The projection requisites for this process are such as to require an extraordinary degree of competence on the part of the operating crews; and it follows naturally that these conditions be reflected in a special type of contract covering the projectionists who handle such intricate equipment.

IP presents here the details of the employment contract negotiated between Los Angeles Local 150 and the Cinemiracle organization. The various sections of this contract testify to the meticulous care exercised both by Local 150 and the exhibitor to insure the most advantageous means of presentation for this film subject.

The contract data follow:

Two Shifts Per Day

4 regular projectionists per shift, including a chief projectionist, for six days of six hours each, at a scale of \$147.24 plus six hours preparatory time per projectionist per week (1 hour per day per man) at a scale of \$24.54—making the total basic weekly wage per man \$171.78.

Two regular relief projectionists for four days of six hours each day at \$98.16 each plus four hours preparatory time each at a scale of \$16.36—making the total basic weekly wage per man \$114.52.

Basic hourly rate: \$4.09 per hour; overtime rate: $1\frac{1}{2}$ times basic hourly rate, or \$6.13 $\frac{1}{2}$ per hour. Preparatory rate: same as basic; standby time rate

for servicing, etc., \$6.13½ per hour.

Each chief projectionist (2) will receive \$25 per week extra.

Standby Requirement

After opening, when installation of new equipment of any description or any attachments, screen illumination tests, replacement of parts, or repairs or servicing is done, at least one projectionist must be on duty and he shall receive time-and-one-half of the basic hourly rate.

Each projectionist who has been regularly employed for one year or more shall receive two weeks vacation during

Combined Trade Conventions



Jack Kirsch, left, and Tom LaVezzi.

Tesma's president Tom LaVezzi and National Allied exhibitors' Jack Kirsch have approved a contract indicating their agreement on arrangements for the Allied-TESMA-TEDA Trade Show at the Morrison Hotel, Chicago, Oct. 12-15 next. Conventions of the three organizations will be held concurrent with the Trade Show, which marks the last of the Fall shows for the organizations. In future, joint shows will be held in the Spring so as to include the drive-in theatre group.

which time he shall receive his regular basic weekly wage including preparatory time

Regular and relief projectionists who permanently sever their employment shall receive 1/6th of their basic weekly salary for each full month's employment.

Except in cases of emergency, projectionists will neither be required nor permitted to perform those services customarily done by sound service engineers. Nor will they be required to furnish sound testing or other equipment except the necessary tools for projection work.

Installation, Repair Work

All installation and repair work shall be done by Local 150 members when it is done in the projection room. When the equipment is sent out for repair within the Local 150 area it must be done by Local 150 members or other IA men.

Supervisors of projection must be members of the IA, and their appointment must be confirmed in writing to Local 150.

When and if desiring to dispose of the services of a projectionist the theatre shall give the man two weeks' notice in writing, or two weeks' salary in lieu thereof. Local 150 shall have the right to investigate all such notices; and where agreement between Local 150 and theatre is not reached, the matter will go to arbitration.

Management agrees that before the opening date of any theatre hereafter acquired by it, Local 150 will be notified and consulted with on the matter of manpower and wage terms.

Television Rights Clause

If any theatre or its facilities be utilized by management for television purposes, or if such permission be granted by management to any other party, it is agreed that all television equipment and its operation shall be under the jurisdiction of Local 150.

Commencing July 1, 1958, the employer will pay to the Local 150 Welfare Fund an amount equal to six cents per hour for each regular straight time contracted hour.

• One of the finest publicity outlets for the motion picture exhibition field, and surely one of the most neglected, is the technique of the making and the showing of motion pictures in studio and theatre, respectively. Properly presented by a competent newspaper writer, the "hows" and "whys" of film technique are readily translated into "ohs" and "ahs" on the part of the public.

A case in point was the recent feature

varn carried in the Detroit Free Press which was based on an interview in the projection room of the Fox Theatre in Detroit with Roy Ruben, member of Local 199 and projectionist at the theatre for the past 30 years. Sporting a deep three-column action photo of Ruben alongside his lighted arclamp as well as a large two-line, three-column head, the story reviews the progress of the movies since the early days, dips into studio and projection technique, refers to the millions-per-picture cost for current fine films, and overall excites the curiosity of and engenders a great respect for the movies in the mind of the reader.

Projectionist organizations might well suggest to theatre management further exploitation of this idea as a terrifically helpful aid in the business-building campaign now under way.

- Tobe Petre, veteran member of Local 228, Toledo, Ohio, who is now living in Florida trying to regain his health, would like to hear from his IA brothers. Petre has been quite ill and misses the companionship of his many friends. Come on, fellows, help cheer up a lonely guy. The address is 110 Nineteenth Ave., S. St., Petersburg 5, Florida.
- Highlights from Calif. District No. 2: Right-to-work legislation was the chief topic of discussion at the recent District No. 2 Council meeting. Many of the California IA Locals have contributed generously to both the State Federation of Labor and the Los Angeles Central Labor Council in the fight against this bill. A total of \$1240 was contributed by the members of Los Angeles Local 150, and George Schaffer, the Local's business representative, urged the delegates at the meting to give all-out support in the fight against anti-labor legislation.

Contributions to the State and Central Labor Councils were also made by Hollywood Locals 165 and 705, Santa Barbara Local 442, San Bernardino Local 577, and Hemet Local 707.

Schaffer also reported that for the first time his Local was successful in negotiating a contract with King Photo Service, thus providing a new job for a member at the basic pay of \$166.50 for a 40-hour week.

New five-year pacts with Fox West Coast Theatres were reported by Don Marshall, business representative for Bakersfield Local 215. The contracts, retroactive to July 1, 1957, call for a 25c per hour increase, plus health and welfare benefits.

Representing San Diego Local 297 George Abrams reported that his Local still maintained the two-man shift in the drive-ins. John Gotchel, secretary for Santa Barbara Local 412, reported that all was serene for the present in his area but he anticipated a bit of trouble when existing contracts expire-July 1

Harry Reynolds, delegate from Local 577, San Bernardino, reported that contract negotiations with Fox West Coast Theatres had reached the counter-proposal stage. Leo Moore, business representative for Hollywood Local 165, informed the delegates that the closing of the Universal Studios plus the unusually heavy seasonal slump made a rather

Todd-AO Installations

For the convenience of our readers who have heard about but have not had the opportunity to view the actual equipment used in the Todd-AO sound picture projection process (and, probably discuss operating techniques with the men who supervise) we append this list of key cities where such equipment is installed -courtesy, of course, of the Todd-AO organization.

ATLANTA, GA.: ROXY; ATLANTIC CITY, N. J.: Virginia Center; Baltimore, Md.: Film Center, New; BEAUMONT, TEX.: Liberty; Boston, Mass.: Gary, Saxon; BIRMINGHAM, ALA.: Ritz; BUFFALO, N. Y.: Century, Granada; CHICAGO, ILL.: Cinestage, McVickers; CINCINNATI, OHIO: Valley; CLEVELAND: Loew's Ohio; COLUMBUS: Hunts; CORPUS CHRISTI, TEX.: Tower; DALLAS: Tower, Wynnewood; Denver, Colo.: Tabor; Fort WAYNE, IND.: Clyde.

HARTFORD, CONN.: Strand; HOLLY-WOOD, CALIF.: Cathay Circle, Egyptian. Honolulu: Kuhio; Houston, Tower; Indianapolis, Ind.: Lyric; JACKSONVILLE, FLA.: Five Points; KAN-SAS CITY, Mo.: Tower; LITTLE ROCK, ARK.: Capitol; Louisville, Ky.: Brown; MEMPHIS, TENN.: Crosstown; MIAMI, FLA.: Sheridan; MILWAUKEE, Wis.: Sheridan: MINNEAPOLIS, MINN.: Academy; Montreal, Can.: Alouette.

NEW ORLEANS, LA.: Panorama; NEW YORK CITY: Rivoli, Criterion; OKLA-HOMA CITY, OKLA.: State; PHILADEL-PHIA, PENNA.: Midtown; PITTSBURGH: Nixon; PORTLAND, ORE.: Broadway; PROVIDENCE, R. I.: Elmwood; Roches-TER, N. Y.: Monroe; SACRAMENTO, Calif.: Alhambra.

St. Louis, Mo.: Pageant, St. Louis; SAN DIEGO, CALIF.: Capri; SAN FRANcisco: Alexandria, Coronet; San An-Tex.: Broadway; SEATTLE, WASH.: Blue Moose; SHREVEPORT, LA.: Saenger; Syosset, L. I., N. Y.: Syosset; SYRACUSE, N. Y.: Shoppingtown; To-RONTO, CAN.: Tivoli; Tulsa, Okla.: Rialto; Youngstown, Ohio: State; UTICA, N. Y.: Uptown; and WASHING-TON, D. C.: Uptown.

gloomy picture. However, he expected things to take a turn for the better within the next few months.

The Council meeting was held at Christie's Restaurant in Chula Vista, and Marvin Barker, business representative for host Local 761, welcomed the delegates. The meeting was presided over by William Wise, Council president, assisted by Lon Bennett, secretary. Special guests were Carl Cooper, IA second vice-president, and George Flaherty, IA representative.

Flaherty addressed the gathering, emphasizing the far-reaching ramifications of the right-to-work bill that California voters will find on their ballots next November. He urged unremitting effort in the fight to defeat this bill, pointing out that many prominent organizations and leading political figures are opposed to this measure.

At the invitation of Frank Smith, president of Local 707, Hemet, the Council will hold its next meeting (May) in Palm Springs.

- Benjamin Doan, retired member of New York Local 306 and member of the 25-30 Club, is recuperating from his recent serious illness at the Veterans Administration Hospital in Long Beach,
- Herb Aller, business representative for IA Cameramen's Local 659 in Hollywood invariably prepares the agenda for all meetings. One item on the list at a recent meeting caught him by surprise-the presentation by the membership of a hi-fi set and a plaque to commemorate his 25th anniversary as b. r.

OBITUARIES

PAMENTER, STEWART, member of Toronto Local 173 for 26 years, died suddenly on March 6. He is survived by a brother, Russell, also a member of the Local.

REED, THOMAS, A. 67, veteran member of

Local 224. Washington, D. C., died last month. He was the projectionist for many years at the Washington branch of the Motion Picture Association of America. •

GILBERT, Tom, 50, member of Local 299, Winnipeg, Man., Canada, died suddenly while helping the stage crew set up the Ice Capades show in the Winnipeg Arena. He was a former member of the Local 299 executive board, and served as chairman of various committees. He also represented the Local as delegate to the Winnipeg and District Trades and Labor Council meetings. Gilbert was a veteran of World War II, having served in the technical branch of the RCAF.

Film Frame Exposure Time

Re-introducing a favorite topic of projection buffs, which not infrequently resulted in the wrong answer.

HAT is the total screen exposure time for each frame of film during the projection process? Back in the "good old days" projectionists had not a little fun with this question, but as often as not most of those who considered themselves well versed in the art came up with the wrong answer. Why? Because the correct answer does not stem, as might be offhandedly supposed, solely from a simple arithmetical exercise but is dependent upon several factors.

The unsuspecting might state that it all depends upon the type of intermittent movement used—but they would be only partly right. It depends upon several factors, all of them variable, and one of the most important is the degree of exactness with which an intermittent is assembled and adjusted. And what about the shutter?

But let's assume that the manufacturer has done a tip-top job on his end, and let's also assume that the shutter is properly adjusted.

Simplex 5-to-1 Movement

This exposition is intended to head off those projectionists who, mindful of the recent introduction of the Hi-Speed Simplex 5-to-1 (60°) intermittent movement are certain to pop the question to their unsuspecting and therefore unprepared brethren. IP is on the side of the underdog.

Let us consider the old Simplex standard 3-to-1, 90° intermittent. (One can work up an argument on this point, too, with those old-timers who will insist that it was a 4-to-1, 70° movement; alas, they're outvoted.) Here's the rundown on this movement:

The intermittent movement, composed of the cam and pin and star wheel assembly, is a 90° movement.

rest of the cycle, which equals 3/96ths or 1/32nd second. So much for the intermittent movement.

Shutter Action Considered

But now we have the period of exposure to the screen to consider. All standard projectors have two-blade shutters, one of which cuts off the light from the screen during the period in which the film is being pulled down. This is, as has been noted,

Advantages of the Simplex Hi-Speed movement used with a 63-degree, 2-blade shutter. As indicated diagrammatically, the new intermittent gives a picture 1.3 times brighter than the picture obtained with a conventional movement used with a 90-degree shutter, lamp lumen output remaining the same.

+1 frame-+ 30,000 19,500 LUMENS HI-SPEED Same light-source 63° Increased screen light output 30,000 15,000 LUMENS LUMENS **STANDARD** Same screen light Reduced lightsource output 23,100 [15,000 LUMENS] LUMENS HI-SPEED

The film moves at 90 ft. per minute; or, 90 X 16 (frames per ft.) equals 1440 frames per minute; or, divided by 60 equals 24 frames per second.

The cam and pin revolve 24 times per second, and at each revolution turn the star wheel 90 degrees, pulling the next picture into frame. Thus the cycle takes place in 1/24th second.

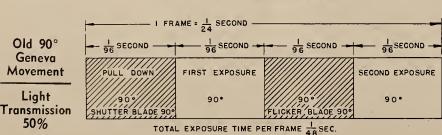
However, since the movement of the film takes place in only 1/4th of the cycle, the 1/24th second must be divided by 4, which equals 1/96th second; and the picture is stationary in front of the aperture plate for the

1/96th second, and the normal exposure to the screen, therefore, would be the same as the period of rest, viz. 1/32nd second.

Since it is necessary, however, to introduce a second, or balance, blade to eliminate flicker (this blade being of equal dimensions to the cutoff blade) another 1/96th second of exposure is chopped off from the screen, leaving only 2/96ths, or 1/48th, second as the final screen exposure time for each frame of film.

The same mathematical approach may be employed with respect to the new Simplex Hi-Speed 5-to-1, 60° movement to result in the exact answer to exposure time per frame for that intermittent. This will not be necessary, however, because the answer is graphically presented in the accompanying diagram on this page—for which incidentally, IP is indebted to Mr. Willy Borberg, projection engineer for General Precision Laboratory.

144 SECOND - TESECONO 1 SECOND - TO SECOND -New 60° High Speed Geneva PULL DOWN FIRST EXPOSURE SECOND EXPOSURE Movement 60° SHUTTER BLADE 1200 120° Light LICKER Transmission //60%/ 66.6% TOTAL EXPOSURE TIME PER FRAME 1 SEC.



Cinemiracle Film Footage

Cinemiracle cameras, which utilize three separate negatives for each take, consumed more than two million feet of Eastman Color negative during the production of "Windjammer," first feature film to be produced in the new ultra-wide-screen medium.

AUDIO · VISUAL

New Automatic Slide Projector by Kodak

DELUXE, completely automatic slide projector that embodies the latest engineering advances for color slide showing has been introduced by Eastman Kodak Co. This new Kodak Cavalcade projector offers: (1) a choice of three methods of advancing slides. First, automatic cycling with four-, eight-, or sixteen-second intervals between slides. Second, powered slide changing which may be operated either from the projector or by pressing a button on a 12-foot cord that is included with the projector. Third, manual slide changing by rotating the advance wheel on the side of the projector. The hand wheel can advance or reverse the slide sequence and may be used even when the projector is set for automatic operation.

- (2) No more slide "popping." A duct draws warm air from a heating element over the slides and pre-conditions them before projection.
- (3) Regardless of their condition, slides are completely protected. Even warped or frayed-edge slides can be shown without danger of jamming the projector or injuring the slide. The reason: another first in slide projection; a steel protector holds each slide. Only the protector is touched by human hands or the mechanism of the projector. Encased in its steel protector, each slide is permanently stored in either a 40compartment magazine (for cardboard mounts) or a 30-transparency magazine that accepts virtually any type of mount. The slide advance mechanism raises the slide in its protector to projection position, then stores it and advances the magazine to the next slide.
- (4) Slides stay in an upright position. A major advance is that each magazine is inserted in the projector right side up. There is no chance for the slides to fall out. The molded magazine tray holds 40 cardboard-mounted slides.
 - (5) Easy editing for more interesting



Eastman Kodak slide projector is a completely automatic unit offering a choice of 3 methods of advancing slides. It comes complete with a 40-compartment magazine in which slides are fully protected before, during, and after projection.

- slide shows. Unique is the ability to "edit" slides without removing the magazine from the projector. In projection position, a slide may be withdrawn easily from the projector or a new one inserted in its place.
- (6) Depending on where and how shown, a choice of 500- or 300-watt illumination can be made by flicking the selector switch.
- (7) Changes slides in a split second. The rapid action shutter darkens the screen during the interval when slides move in or out of projection position. Less than a second elapses between slides—two or three times faster than present automatic projectors.

Excellent Optical Setup

- (8) An extra-fast five-inch f/2.8 Kodak Ektanon lens is standard equipment. Four- and seven-inch f/3.5 lenses are available as accessories. All are focused by the same microfocus knob action. The projector critically focuses down to four feet.
- (9) A movable pointer is provided that can be used to superimpose an arrow silhouette over the projected image. One can point out interesting aspects of each slide
- (10) Easy elevating and focusing. A spring-balanced mechanism permits easy elevation from zero to nine degrees. Another knob at the back of the machine is used to level the image on the screen. A microfocus knob for easy and accurate picture focusing is provided.
- (11) A versatile condenser system provides extra-brilliant projection of 35-mm and Bantam slides. Condenser lenses and reflectors are readily removable for cleaning, and they are numbered so it's easy to replace them properly. Offered as an accessory is a special condenser for the brightest projection of the 1½-square-inch super slides at \$4.50. list.

(12) A new, extra-powerful lamp. The Cavalcade comes with the new Westinghouse 500-watt ASA Code DBJ Lamp which has the new "Focus-Lok" base for quick removal or insertion.

Variable-Focus 16-mm Lens

Bell & Howell's new variable-focus lens for 16-mm movie projectors is designed to solve many problems caused by varying projection distances and screen sizes. Instantly and continuously adjustable to any focal length between 134" and 214", the new f/1.6 Filmovara lens embodies flexibility and versatility.

In the school, for example, this one lens will serve for both classroom and auditorium showings. In industry it will produce the right picture sizes for in-



B. & H.'s new Filmovara lens for 16-mm silentsound movie projector. Problems caused by varying projection distances and screen sizes may be solved by rotating a fluted ring on the lens barrel, giving a larger or smaller picture without moving either projector or screen.

dividual sales presentations, conference room showings, and film programs in the plant cafeteria. Similarly, in the religious field the new lens is useful for small instruction groups as well as for gatherings of the entire congregation.

Simply rotating a fluted ring on the lens barrel changes the focal length to provide a larger or smaller picture without moving projector or screen. Once the desired focal length is set, fine focusing for needle sharpness is done by rotating the entire lens.

The Filmovara is of 9-element design. highly corrected, and coated for maximum light transmission. The barrel styling features anodized light gold aluminum, black, and bright aluminum fluting.

GPL TV Camera Chain

A NEW viewfinder television camera chain for classroom or studio use has been introduced by General Precision Labs

The compact TV system, known as GPL Model PD-250, consists of a vidicon (Continued on page 25)

Multi-Purpose Help for Projectionists[†]

By FRANK STREET

Technician, Audio-Visuol Center State College of Washington

THE PROJECTION CART was designed to fulfill the need for a cart that could move equipment up and down stairs, over gravel roads, etc., with ease, still providing a functionable projection stand when the equipment reached the auditorium. An important requirement of this projection stand was that it must be approximately 50 inches high so as to project over the heads of the audience.

Thus the base plate (and table top) is constructed of 3/32-inch aluminum, 16 by 22 inches, bolted to the fixed legs which are bent to form a 110-degree angle with the upright. The legs are of 3/4-inch while the bracing is of 1/2-inch thin wall conduit. It is surprising how much strength is developed as the bracing is brazed onto the legs.

The legs are spaced wider at the bottom than at the base plate to provide stability which is a must requirement for a good projection stand. A 6-inch long steel slug is inserted at the hinge end of the movable legs to



FIG. 1. Projection equipment cort is shown up-ended and with legs braced to form a procticol ond sturdy projection stond that is neither bulky nor owkword to handle.

give added strength at the hinge. The hinge is formed by two pieces of strap steel brazed to the sides of the fixed leg at the point where the angle bracing is brazed to the end of the fixed leg.

+ Ed. Screen & AV Guide, Oct. 1957

The end of the movable legs and the slugs are drilled to complete the hinge when a 3/16-inch bolt is passed through the entire assembly. The movable leg also is used to adjust the table top level which adapts it to any kind of floor surface. The maximum movement of the leg is controlled by a chain fastened between the movable and fixed legs.

The 12-inch semi-pneumatic wheels are fastened to the legs by a ½-inch steel shaft inserted into a section of ½-inch thin wall conduit that is brazed to the rigid leg at a height to give the cart a proper balance when loaded with equipment, and allows the base plate to clear the ground about 3 inches when in a normal traveling position. The size of the wheels makes it easy to take the cart up and down stairs with as much as a 100-pound load without causing sudden jars on the equipment. Total weight of the projection cart is 31 pounds.

The first model has been in use on the Washington State campus for approximately two years and the model pictured is a later version. However, there are only slight changes from the first model.

The flexibility of the cart can be improved by the use of webbing belts to secure the screen, etc., to the cart



FIG. 2. Stond is now reversed and compoctly folded ond looded with equipment. Proper balonce ollows os much os 100 pounds to be tronsported without jors to equipment.

when moving equipment. Besides being a projection cart and stand, it has been found as an ideal general utility cart to have around the Audio-Visual Center to transport all kinds of equipment.

Projectionist License Exam Questions

ERE is another installment in the series of examination questions and answers being presented from time to time in these pages. Reaction to this series has been exceptionally favorable, with even some of the old-timers realizing how easy it is to grow a bit rusty on fundamentals. A mark of 75 is considered a passing grade. Correct answers appear on page 22.

1. In which of the following ranges of focal-length do motion picture projection lenses usually fall:

- (a) 2 to 6 inches; (b) 6 to 12 inches; (c) 12 to 36 inches; (d) 36 inches and up.
- 2. Professional type projectors should be installed in:
- (a) any enclosure you desire; (b) an approved fire resistant booth; (c) front of the screen on an open but insulated platform; (d) back of the screen on an open but insulated platform.

3. The prevention of fire is an impor-

tant matter in the projection room. For that reason a "fire-trap" is provided. Where is the fire trap located?

- (a) over the projection and observation ports; (b) on the doors of the room, for automatically closing them; (c) where the film leaves the upper magazine and enters the lower magazine;
- (d) in the vent of the film cabinet.
 4. The purpose of the reflector in the lamphouse is:
- (a) to reflect all the light possible coming from the arc to the condenser lens; (b) to prevent the arc from pitting the rear of the lamphouse; (c) to reflect the light from the arc to the "spot" of the gate; (d) to prevent the arc from pitting the condenser.
- 5. The scanner drum is:
- (a) a flywheel on the drive shaft for keeping the film steady; (b) an instrument for measuring the screen illumination at various points of the screen;

(c) the framer; (d) a special flywheel

for keeping the film motion steady so as to ensure steady sound reproduction.

6. The constant-speed sprocket is located in the course of threading:

(a) just ahead of the scanner drum;

(b) just behind the scanner drum;

(c) ahead of the picture gate; (d) behind the picture gate.

7. When making splices which procedure would you follow:

(a) the emulsion should first be scraped off the ends of the film and then the cement applied; (b) the splicing fluid should be applied first and then the softened emulsion scraped off; (c) the excess cement should be scraped off with a knife at the completion of the process; (d) the excess cement should be removed with collodion.

8. The "Geneva" movement is:

(a) another name for the scanner drum;

(b) another name for rotary stabilizer;

(c) another name for the intermittent movement; (d) another name for the constant-speed sprocket.

9. The purpose of the condenser lens is:
(a) to collect the light from the arc and converge it upon the picture gate;

(b) to focus the picture image upon the screen; (c) to correct for aberrations of the optical system; (d) to keep the optical system cool.

10. A rectifier is a device for:

(a) inverting the picture image; (b) converting alternating current into direct current; (c) increasing the sound volume; (d) controlling the sound volume.

11. Does increasing the current through the arc increase the amount of light emitted by it?

(a) yes, indefinitely; (b) it produces no effect; (c) yes, up to a certain point;

(d) no, it decreases the light.

12. Is the light emitted by the arc uniformly in all directions; that is, will the bare arc illuminate the screen uniformly all over its surface?

(a) yes; (b) yes, if the screen is not too far away from the arc; (c) yes, if the current in the arc is at its proper value; (d) no, unless the distribution of light is rendered uniform by a proper optical system.

Ultra-Fast 16-mm Lenses

New possibilities for low-light-level movies have been opened by the introduction by Paillard, Inc., of two high-speed Som Berthiot Cinor lenses for Bolex 16-mm movie cameras. These highly-corrected 25-mm lenses are Cinors f/0.95 and f/1.15.

The f/0.95 is in a standard "C" mount for all "C"-mount 16-mm movie cameras; while the f/1.15 is for the Bolex H-16 Reflex camera only. Each lens will sell for \$205.



Your SIMPLEX Projector Mechanism represents a priceless investment. You bought it after long, careful study because you recognized it as the finest projector on the market.

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PERSONAL NOTES

BOYCE NEMEC has been named executive vice-president of Reevesound Co., Inc., manufacturer of machines for professional motion picture sound recording. Nemec was for ten years from 1946 executive secretry of SMPTE, professional engineering society. For the past two years he has been an independent management consultant specializing in administrative and technical aspects of motion pictures and television. During World War II he was director of the Army

Signal Corps' photo and motion picture research and development laboratory.

ERVIN R. GEIB, for many years manager of arc carbon sales, has officially retired after more than 50 years of service to National Carbon Co. Spanning the fabulous growth of the movie industry during the past half century, Geib's career started with a job as office boy in September, 1907. Working with the people engaged in supplying the motion picture industry with arc carbons for theater projection and also studio set lighting, he went on to become a nationally-recognized authority in his field.

The accurate reproduction in the carbon arc of all the colors present in sunlight necessary for the projection of color



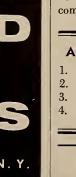
Ervin F Geib

movies, and the introduction of simplified, high-intensity projection are but two of the problems of advancing motion picture technology faced and solved by the arc carbon industry during Geib's career.

KODAK RESEARCH LABORATORIES has announced three new executive appointments. Dr. Julian Webb has been named head of the physics division of the laboratories; Dr. George C. Higgins becomes associate head of the physics division; T. Gentry Veal is appointed an assistant head of the physics division. All three appointees have distinguished records in physics, electronics, and photography. Webb and Veal have done research at the Oak Ridge atomic plant.

FREDERICK H. GUTERMAN has been appointed general manager of the technical products division of DuMont Laboratories, Inc. He will be responsible for overall sales and marketing of oscilloscopes and associated electronic test equipment, automotive test equipment, industrial TV systems, and two-way mobile radio systems. Prior to joining DuMont, Guterman was assistant vice president, sales and planning, at American Bosch Arma Corp.

ROLLAND L. SHOEMAKER is the new manager of commercial service for RCA Service Co., Inc. Joining RCA in 1947 as TV technician, Shoemaker served as TV service branch manager in Pennsylvania, and for the past fifteen months he has been in the post of manager of commercial service field administration.



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Answers to Projectionist Exam.

1.	(A)	5.	(D)	9.	(A)
2.	(B)	6.	(A-C)	10.	(B)
3.	(C)	7.	(A)	11.	(C)
4.	(A)	8.	(C)	12.	(D)

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DRIVE-IN PROJECTION

(Continued from page 12)

red should be an intense, very deep red, not a scarlet. The green should be a rich green, not a pale green and neither yellowish nor bluish. The blue must be a deep, clear blue having neither the greenish tinge of cyan nor the violet tinge of ultramarine or indigo.

The chromatic intensity of the colors produced by additive mixture is so great when fairly pure primary filters are used, audiences regard the display as unforgettably striking. But for the full effect to be obtained, the floodlight bulbs must be very high-powered, and the screen must otherwise be dark.

Footlighting, Other Effects

Because the colored beams become less intense toward the bottom of the screen, the "top lighting" should be supplemented by footlighting which, for the most striking effect, should be entirely of one brilliant color, preferably red or rose (magenta). Of course, the order can be reversed, with the overlapping multicolored beams shooting up on the screen from the bottom to meet a flood of clear blue across the top.

An additional effective touch of color may be provided, where expense is no objection, by a neon-tube surround for the entire gigantic screen. The color should not be too glaring—blue if red bottom-lighting is used, or rose-pink if blue top-lighting is chosen.

If an effect spotlight or powerful carbon-arc stereopticon is available, a color-effect slide made by splattering a plain cover glass over its entire surface with transparent colored slide inks will enable extremely beautiful effects to be produced by color addition with the floodlighting. A dual slide "dissolving" stereo projector multiplies the possibilities for spectacular display. Any colored scenery projected upon the screen to emulate a theatrical backdrop should be produced by skilfully handpainted slides, not by Kodachromes. The gelatine of photographic emulsions is apt to blister upon prolonged exposure to the intense heat of the projecting lantern.

A projecting kaleidoscope to produce ever-changing geometrical patterns of color on the screen immediately suggests itself, but this is one idea the writer has never seen tried. In fact, we know of no commercially available apparatus of this nature. The attachment of an ordinary novelty kaleidoscope to a carbon-arc slide projector will probably result in failure because of the heat problem.

We strongly feel that manufacturers of theatrical spotlights, stereopticons, and effect projectors would do well to concentrate their efforts upon a new line of extra-powerful color-effect projectors for drive-in use—a line which is desperately needed for raising the

general quality of drive-in showman-ship.

Breathtakingly beautiful effects can nevertheless be created with nothing more than the multicolor tower lights and footlights described in the foregoing. If separate electrical circuits are provided for the tower lights, the three primary colors can be used individually to build up the opening of the show.

The green floods (visually the brightest) can be on when the first



Sharper Pictures, More Light on the Screen, Greater Contrast, and Greater Definition...and this under the most trying outdoor operating conditions. Actually 7 out of 10 new Drive-Ins install Super Snaplite Lenses...and more and more established Drive-Ins are turning to Super Snaplites. Ask for Bulletin No. 212, it gives you complete information on these lenses.



NORTHAMPTON, MASSACHUSETTS

patrons arrive. In bright twilight these will produce little more than small spots of green luminescence at the top of the screen. As it grows darker, however, the green areas will seem to become brighter, and extend farther down, a cue for filling the remaining areas with red, blue, and all the mixture colors which they automatically form.

Special Showtime Theme

A specially selected overture theme may be placed upon the phonograph turntable $2\frac{1}{2}$ or 3 minutes before show time; and the moment this begins to play, the red or rose footlights should be switched on to provide a spectacular flood of color which ascends from the bottom of the screen to meet the vertical bars of color coming down from the top.

The overture record played at showopening time should have a character different from that of the preceding interlude music, and be played every night for two weeks, or even a full month, before it is replaced by a different selection of the same general type. The show-opening music, by being more "theatrical" than a run-of-the-mill hit of the day, and by being played at the opening of every performance (and at no other time) "cues" the audience to prepare itself for the immediately ensuing screen entertainment.

The music of the special overture should be emotionally dramatic in a "relaxing," rather than an "exciting," way, but it should never be of a depressing nature. Above all, it must be beautiful music. As much depends on the interpretation, or style of playing, as upon the composition itself.

A semi-symphonic or concert-style instrumental rendition of a memorable musical-comedy melody, a nostalgic "standard," a special arrangement of movie theme music, mood music in tempo and with a clear-cut melody, or even jazz in the style of Mantovani, Kostelanetz, and their imitators—any of these is good for the purpose.

Use of Commercial Records

Best of all, perhaps, is the powerful music of the theatre pipe-organ. This

type of music, popular, standard, or semi-classical, is played on orchestral pipe-organs of the kind installed in large theatres, not on "electronic organs," which have neither the pleasing tonal quality nor the romantic expressiveness of "the mightiest of instruments." Theatre-organ music. which may be found on old 78 RPM and new LP 331/3 RPM records, is characterized musically by open harmony and a more or less legato rendition of the solo, or melody, with frequent use of glissandos. The emotional tone colors of the theatre pipeorgan are varied, and nearly always modified by a strong vibrato.

If it be remembered that the overture music played at opening time is to set the stage dramatically by a change of pace and tonality, and yet be completely pleasing to the large majority of the audience, then not too much difficulty in its selection will be experienced.

While the color-lighting effects may be repeated at the concession breaks, it is advisable not to play the showopening overture record again, but use a different selection of the same general type to resume projection.

As one will most readily appreciate, the color-lighting routine, perhaps more gaudy than indoor-theatre effect lighting, substitutes for the grand drape and title curtains which are not available in any drive-in for a truly theatrical type of opening. It is by painting the screen with a rainbowgamut of glowing color that the bareness of the drive-in is subdued, and at least a hint created of the wondrous glamor which can be found and experienced only in the theatre.

Canadian Theatres Operating

Theatre construction in Canada during 1957 reached an all-time low, excluding the war years. A survey made by the Canadian Film Weekly shows that 15 roofed and 3 drive-in theatres were opened there last year, bringing the total number of 35-mm spots in Canada to 1,692 roofed and 236 drive-ins, a total of 1,928, as contrasted with 2,014 at the end of 1956.

Book Price Erratum

In a review of "The Audio-Visual Manual," by James D. Finn, in these pages last month it was inadvertently stated that the price is \$7.50. The correct price of this book is \$9.50.



AUDIO-VISUAL

(Continued from page 19)

camera with 5-inch electronic viewfinder, four-lens turret and either portable or rack-mounted camera control unit. A control console equipped with a 14-inch picture monitor, 5-inch waveform monitor, and rack-mounted camera control unit with remoted control panel is available for studio installations.

Designed for one-man operation, the system incorporates printed camera wiring and silicon diode rectifiers in the electronically-regulated power supply. A zoom lens can function as one of the regular four-lens complement.

The system accepts external RETMA sync, or may be operated independently. from an internal sync generator. Both composite video for standard monitors and modulated RF signals for the antenna input of commercial TV receivers are provided. The system has full 600line resolution.

The 28-pound TV camera is equipped with high definition, 5-inch viewfinder with aperture correction, front and back tally lights, and intercom. The four lens turret, accepting any 16-mm C-mount lens including zoom type, is manually operated from the back of the camera.

On the camera's rear are viewfinder brightness and contrast controls, plus camera control of beam, target and electronic focus.

16-mm Safety Factors

SEALED LUBRICATION and a safety interlock which automatically "remembers" to disengage the rewind gear are features of a new model of Bell & Howell's Filmosound 16-mm projector.

The new Filmosound 385 has a rewind safety interlock built into the newly designed takeup reel arm, relieving a common cause of film breakage. The arm has a spindle which automatically disengages the rewind gear when the reel of film is removed. This means that the projector cannot accidentally be started in the rewind position when a new film is to be shown.

The factory-sealed lubrication eliminates the need for oiling the projector, and assures the proper amount of lubricant for each moving part.

The new projector has a 15-watt amplifier and a voltage regulator which keeps voltage to the photocell constant. Reserve gain (not needed for normal operation) is provided to compensate for variation in soundtracks and assure ample sound volume in low-voltage areas.

NTS Closed-Circuit TV

The Educational Television Products Division of National Theatre Supply Co. has been appointed national distributor of General Precision Laboratory closed-circuit television systems for educational institutions. The appointment marks the first time that nation-wide local sales and service have been offered by a manufacturer of closed-circuit television through an affiliated company, since both companies are subsidiaries of General Precision Equipment Corp.

The selection of National Theatre Supply Company with its 27 branch offices in as many cities throughout the country is designed to meet the increased sales and service requirements of the growing educational market for closedcircuit equipment. The individual needs of the school field call for specialized, on-the-spot application know-how.

Eastman Kodak's Record Year

Sales and earnings of Eastman Kodak Co. for 1957 were the highest the company has had; there were increases also in the company's total volume of production, number of new products, dividends on common shares, employee wages, and number of share owners.

Consolidated sales of the company's U.S. establishments in 1957 amounted to \$798,283,443, about 5% more than in 1956. Net earnings after taxes were \$98,108,305, an increase of 4% over 1956, the best previous year. Earnings were equal to \$5.09 per common share.

Total sales of photographic films, papers, and chemicals, advanced over 1956. Continuing sales gains were made by films for amateur still picture taking and home movies; by professional sheet

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films; x-ray films for medical and dental uses; papers for Verifax Office Copiers; color photo papers; and chemicals for color processing. Professional motion picture film sales were moderately below 1956, although use of these films for television continued to grow.

RCA's Showing for 1957

Net profit of Radio Corp. of America last year was \$38,549,000 after taxes. compared to \$40,031,000. Dividends were \$3.50 on preferred and \$1.50 on common. the same as in 1956. The corporation last year achieved the largest volume of sales in its 38 year history, \$1,176,277,-000, up 4.3% from 1956.

While sales rose to a record peak, the report said, "softening of general economic conditions and the highly competitive situation in the radio-TV industry caused a 3.7% reduction in profits for the year compared to 1956."

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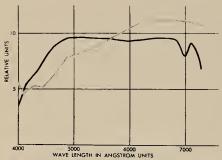
SCREEN-LIGHT TERMS

(Continued from page 7)

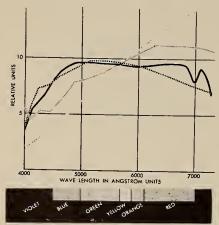
jection assures an evenly balanced light with all colors present in essentially equal intensity.

H-I Arc Premier Light Source

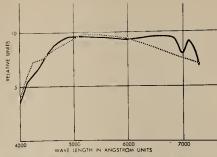
Indisputably, based on verified scientific data, the color distribution of the high-intensity carbon are approaches



The darker line represents the sun. The lighter line is the low-intensity carbon arc.



The lower dotted line represents the incandescent filament lamp. The comparison shows that the high-intensity carbon arc light [upper dotted line] very closely matches the colors of the sun.



Against the solid line of the sun, the dotted line represents the high-intensity carbon arc.

that of sunlight. The much lower relative light output of the low-intensity arc and of the incandescent filament lamp is so obvious as to require no further comment here. The high-intensity light source is, of course, that *quality* of projection light for which theatrical color film is processed. It is the only quality of light that gives natural color reproduction with standard 35-mm color film.

Low-intensity lamps give a light of yellowish tint which distorts color values and detracts from the realism and beauty of color pictures. The high-intensity arc, emitting essentially equal intensities of all the spectral colors, reproduces all hues and tints with remarkable accuracy.

When it is considered that the record of progress in the production and utilization of carbon arc projection light shows a 10:1 improvement in brightness of the source, a 30:1 improvement in efficiency of screen light production, and a 90:1 improvement in the volume of light on the screen, together with marked improvements in color quality and steadiness, it is not surprising that projection lighting practice has kept fully abreast of progress in all other stages of the industry.

Along with this technical advance there has been a 7:1 reduction in operating cost per unit of light on the screen!

compensation for a reduction in light intensity by other means, such as dimming the source light.

Newhall cited an example of "color constancy." When a piece of coal is viewed in bright sunlight it still appears black. Snow even with a dark shadow upon it, looks white. Yet the coal is reflecting more light to the eye than the shadowed snow. He explained that the individual perceives that the snow is in shadow and compensates for the missing light intensity. Contrast also plays a part, for the eye is light-adapted when viewing the coal, and dark-adapted in the shadow. Also, a shadow has no sharply defined boundary such as is perceived with the coal, he said.

Because of this individual compensating characteristic, Newhall said, the Kodak experiments have shown less color difference from shadowing than would normally be predicted on the basis of actual light difference.

Artists have known of this effect for centuries, he said, but Kodak scientists are now able to measure it more quantitatively for use in color photography. The experiments show that hue and saturation are changed very little by shadowing, while lightness, though affected most of all, is diminished only about one-third of the predicted amount, Newhall said.

NEW LIGHT CONTROL

(Continued from page 14)

bearing rollers mounted on a short bar which is rotated by the motor shaft. The movement of the clutch arm is adjustable, the adjusting screw and knob direction being indicated by an "Increase Feed" arrow. The normal throw of the arm is only 0.240 inches.

AC Disconnect Unit

Since some of the components of the Micronic Control are operated by AC, such as the timer, small rectifier and negative feed motor, when the burning of the arc is not required these units are automatically disconnected by means of a DC relay connected across the arc DC terminals. This relay can be operated on any DC power supply up to 130 volts.

In the small disconnect box which is usually mounted on the left-hand side of the projector base is also the unit fuse and a switch which connects the automatic control, or in its "off" position allows the lamp to be operated in the normal "manually adjustable" position.

MITCHELL'S MANUAL OF PRACTICAL PROJECTION

(See back cover)

Accurate Color Perception Data From Kodak Scientists

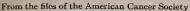
Studies of how shadowing affects the eye's perception of surface have been reported by three Kodak scientists. The research is related to what is known as "color constancy" by which perception of color is influenced by the individual's awareness of surrounding light and shadow. Color constancy tends to make hue, saturation, and lightness remain constant even when a color sample is seen under varied lighting.

The studies were made by Sidney M. Newhall, Robert W. Burnham, and Ralph M. Evans of Kodak.

Ten test "surface colors" were used in the experiments. Differences in hue, saturation, and lightness appeared when a shadow was cast on the sample, the scientists said. When just the sample was shadowed, the results differed from those obtained when the background was shadowed as well. This was because the eye adapted to the over-all shadow, it was explained.

Example of "Color Constancy"

Shadowing the sample gave different color values from those obtained when the light intensity was diminished by other means, the researchers said. They found that an observer compensates automatically for what he perceives as a shadow. But there is no corresponding





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ROBERT A. MITCHELL'S

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 The author covers clearly and thor-

oughly every aspect of motion picture projection, presenting his material in easily understood language—not too technical, yet technically accurate. The Manual is divided in 8 sections and contains 30 chapters — a valuable reference work no progressive projectionist should be without.



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Monthly Chat

The Cinemiracle Process

The Cinemiracle production of "Windjammer" which traces photographically the 17,000-mile voyage of a trans-Atlantic cruise of a 3-masted square rigger on which Norway trains young men for its merchant marine, proves conclusively the unique superiority of the widescreen for spectacle and grandeur. It is regarded generally as a slightly improved Cinerama. But it still is a "gimmick" because it would seem to be a technical impossibility to do a dramatic film in the process. Says Louis de Rochemont, its producer:

"The difficulty would be with intimate scenes. For a closeup it would be necessary to take the Cinemiracle cameras to within inches of the actors' faces. You cannot have reverse shots. You cannot tilt the cameras. 'Pans' are very difficult.'

"Windjammer" is now current in five citics: New York, Chicago, and Los Angeles, in the U.S.; London, England, and Oslo, Norway. It is definitely a big-city roadshow, the costs of production and exhibition, not to mention huge wall-to-wall screen space, obviating any other showings.

Camera, Printing Procedure

Cinemiracle is a three-film, three-camera, three-projector process. The camera unit weights 500 pounds and consists of 3 Mitchells so arranged that the middle one photographs what is directly in front of it, and the left and right ones photograph mirror reflections of the areas to the left and right of the central camera's range. The use of mirrors for the side images, instead of direct photography as in Cinerama, is supposed to improve the alignment of the segments of the total scene that have been recorded on three different films.

Each camera image overlaps the other, and in the printing process this overlap is "grayed out" (vignetted) so as to eliminate the panel lines on the print and, it was hoped, on the projected screen image. Alas, the latter is not accomplished, the panel lines being clearly visible.

In the theatre, the three projectors are set up in one enclosure some 20 feet wide and are selsyn-interlocked for both picture and sound, the latter being a seven-track magnetic job actuating five screen speakers and two surround channels for the sides and rear of the theatre. Practically no projection angle is tolerable, possibly 3° at the most.

The screen (Roxy Theatre, N. Y.) is about 90-plus feet wide and 40 feet high, with a curve of 12-14 feet in the center. The "bowl" effect of this curve seemed to this observer somewhat more pronounced than in Cinerama. The screen images occupy a visual area of 146° horizontally and 55° vertically (normal human vision takes in 160 and 60).

The Projection Setup

Like the Cinemiracle camera, the two side projectors use mirrors mounted on the enclosure front wall. The image from the *left* projector (facing the screen) is projected to the *right* panel, the *right* projector image being projected to the *left*—that is, in reverse and entailing a light-beam crossover at a predetermined spot in the auditorium enroute to the screen panels. The center projector shoots straight ahead.

The projectors (Centurys) drive the film at 146¼ feet a minute, the film having a 6-hole pull-down, the frames being one inch wide by 1½ inch high and running through at 26 frames a second. This setup required considerable doing to (Continued on page 26)



The New STRONG JETARC PROJECTION LAMP

The Most Powerful Controlled Light Source in the World!

Delivers double the light projected by ony $16\frac{1}{2}$ " reflector lomp. Projects oll film widths by ony process without change of reflectors. The main mirror, on integral port of the reor door, is of the cold gloss type, 21 inches in diameter — the largest ever put into regular production. Delivers up to 65,000 lumens with wide opertures.

A TOTALLY DIFFERENT SYSTEM! Three dimensional, cylindrical shaped light source, rother than the flot, disc-like face of the arc of conventional lamps, increases the available pickup angle to more than 260° . An auxiliary 4-inch spherical reflector is located behind the positive carbon. A 10 mm. \times 25" non-rotating Ultrex positive and rotating $7/16'' \times 12''$ solid Graphite negative burn at 140 to 160 amperes and 70 to 78 volts.

THE POWERFUL STRONG U-H-I ULTRA HIGH INTENSITY PROJECTION ARC LAMP

Beom shoper lens provided for use with the 13.6 mm. trim lomps potterns the spot to the porticular size and shope of the operture so as to efficiently utilize all useful light. Employs "cold" reflector. Exclusive automatic croter positioning system maintains the tip of the burning corbon at the focal point of the reflector. Eliminates change of light color at the screen, caused by variation in carbon burning rates. Optical system quickly adoptable to the various projection systems.

THE STRONG SUPER "135"

Burns o choice of four corbon trims (9, 10, or 11 mm. regulor, and 10 mm. Hitex) to attain only desired degree of cost of operation, screen illumination, or burning time. Quick, simple changes attain the correct light requirements for any presentation technique. 18" f 1.7 or 161/2" f 1.9 reflector. Single control amperage selection. The arc is stabilized by its own magnetic field (no magnets are required) and by an air jet which prevents deposit of soot an reflector.



Machine Vibration and Image Steadiness

By ROBERT A. MITCHELL

Vibration in any unit of the projector mechanical or optical train is the relentless enemy of good reproduction. Some of the basic causes of such defects are discussed herein.

NO ONE would deliberately ruin the performance of a fine projector mechanism by mounting it on a wobbly saw-horse type of support. But are some of the older projector bases much better than saw-horses? We have in mind those bony 4-legged structures of pipe and cast-iron brackets designed during the early days of sound motion pictures by, we presume, sadistic plumbers. They allow the projected picture to jiggle whenever a magazine door is opened, a lamp adjustment touched, or a lop-sided reel of film projected. And under the impetus of a slightly unbalanced soundhead flywheel, they vibrate strongly

enough to nullify the precision action of a modern intermittent movement. We could never tell, when operating on these antiquated monstrosities, whether sidesway was caused by a faulty guide roller or a rhumba-like convulsion of the universal (?) base.

The picture on the screen simply cannot be rock-steady when the projector support allows the mechanism and arc lamp to move!

Modern manufacturing methods have made possible Geneva intermittent movements of unprecedented accuracy. The registration of the film from frame to frame is extremely precise in the newer projectors made by manufacturers who devote special attention to the machining of bearings, starwheels, cams, and sprockets.

Modern Projector Efficiency

Projectors such as the Brenkert BX-40, BX-60, and BX-80, and the new Century models H and HH employ large-size stars and cams for the highest possible degree of image steadiness

and long life. The Century and Brenkert projectors furnish the best answer to European critics of the small star-and-cam size of most American mechanisms!

To mount these or other fine mechanisms on Western Electric universal bases or the somewhat similar Motiograph H bases is sheer folly-yet, it is being done every day. Likewise, the use of old-style Simplex pedestals with heavy modern arclamps is simply stupid. Lamps were much smaller in the days of the Simplex Regular and Super mechanisms. The light-weight columnar pedestals were adequate 20 years ago, but they fail to meet the exacting requirements of high-powered wide-screen projection. They should be retired to Eastman House or the Smithsonian Institution,* and their place taken by modern heavy-duty projector supports.

Not all machine-vibration problems are solved by sturdy bases, however.

Rigid, well-balanced supports we must have; but not even the sturdiest of them can completely overcome the effects of dynamically-unbalanced flywheels, bent shafts, lop-sided shutters, motor armatures, and drive couplings. Rapid vibration of a projector, when it shows up on the screen, may either blur the finer pictorial detail of the image or cause the picture to dance or tremble.

Lenses, intermittent movements, and even the prints have been blamed for projection defects which were ultimately traced to machine vibration!

Base Steadiness Test

Gross machine movements caused by an unsteady mounting are comparatively easy to detect. It is only necessary to test the steadiness of the machine with the hand. If the projector "gives" when an attempt is made to shake it gently, then a projection test should be conducted to determine whether the motions of the machine result in picture unsteadiness.

Project blank light upon the screen and bring the edges of the aperture into sharp focus. Use the Cinema-Scope prime lens with the regular non-anamorphic aperture to get a clear undersized image of the aperture on the screen. Then try to shake the machine gently and observe whether the

^{*}Repositories of outmoded curios in the arts and sciences.

aperture image jiggles on the screen.

If the image of the aperture moves, you may be sure that opening and closing the magazine doors and performing other operations on the machine during projection will produce convulsive movements of the picture. Worse, unbalanced reels of film and vibration caused by the motor, the soundhead flywheel, etc., will likely result in a persistent jumping of the image which, even if minor, may be annoying to patrons seated near the screen.

Firm Floor Support Important

The projection-room floors in some of the older small theatres are too unsteady to provide satisfactory support for the motion-picture projectors. This is especially true of those old-time theatres in which a box-like projection "booth" is built on the balcony. The floor, generally of asbestos-board tile on wooden boards nailed to sagging joists, bounces under the foosteps of the projectionist. The writer recalls one old theatre, now replaced by an upto-date showplace, where the picture did a stately gavotte on the screen every time patrons walked past the balcony booth.

The use of rubber pads under the base-plate or feet of the projector pedestals to deaden the conduction of noise through the floor is another cause of undesirable projector movement. Pads of cork composition, not of springy rubber, should be used where soundproofing of this sort is required. It is always preferable, of course, to place the pedestals in direct

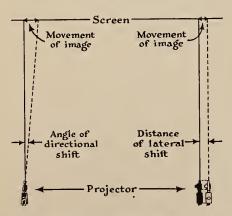


FIG. 1. Angular and lateral movements of a projector and their effect upon the steadiness of the screen image. Small angular displacements—changes in the direction of a projector—result in relatively large movements of the picture, while movements of the projector perpendicular to its optical axis produce movements of equal magnitude on the screen.

contact with the hard linoleum-covered or painted floor; and if the projection room has been properly designed, the cement or brick floor is not likely to communicate the whir of the projection machinery to other parts of the theatre.

In no case, however, does it seem advisable to *bolt* the projectors to the floor. It may be nesessary to alter their position at some future time.

Angular Machine Movements

Before examining other undesirable movements of a motion-picture projector and its optical components, let's see which directions overall vibrations must take to produce an appreciable effect on the steadiness of the projected image.

Considering the entire projector as a rigid unit, the effects of changes in its position are easy to evaluate. The rays of light travel from the projection lens to the screen in straight lines, and the optical axis of the system is straight throughout. The optical axis may, in fact, be envisioned as a thin, perfectly straight rod extending from the center of the lamp mirror through the centers of the positive carbon, the film aperture, and the projection lens to the center of the screen.

Any change in the direction of a projector, whether azimuthal or vertical, produces a shift in the screen image equal to the projection distance multiplied by the tangent* of the angular change in direction. Thus if a projector is swivelled by only one-half a degree in a theatre having a 100-foot throw (1200 inches), the picture will move on the screen nearly $10\frac{1}{2}$ inches!

Image shift = Throw \times tan A $1200 \times \text{tan } \frac{1}{2}^{\circ}$ = Image shift $1200 \times 0.00873 = 10.476$ inches

This illustrative example is worth a moment's contemplation because it shows how greatly a very small change in the direction of a projector affects the orientation of the projected picture. One-half a degree of angular change in the direction of the optical

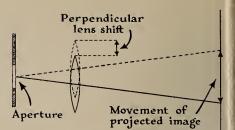


FIG. 2. Any movement of the lens perpendicular to the optical axis produces a large movement of the projected picture. Lens mounts should therefore be very rigid.

axis is equal to 30 minutes of arc. This is the "angular diameter" of a pea held at arm's length. One-tenth of this change in direction—3 minutes of arc—results in an image shift of 1 inch at a 100-foot throw. If a projector vibrates in such a way as to produce a rapid oscillation in angular direction amounting to only 3 minutes, the picture will weave or rock rather violently.

Other Movements

If a projector moves from side to side in such a way that the optical axis always remains parallel to its original position, there is no change in angular direction, and the projected picture will shift laterally exactly the same distance as the projector does.

For example, a 0.1-inch shift of the projector will produce a 0.1-inch shift in the picture, regardless of the throw. This may be too small a movement to be visible, hence any shift in the position of a projector perpendicular to the optical axis results in a minimum amount of image shift.

A projector may also move forward and back along its optical axis without appreciably affecting the picture. Theoretically, the picture becomes smaller as the projector moves toward the screen and larger as it moves away; but when the vibration amounts to only a fraction of an inch, the change in picture size is infinitesimal.

[Assuming that a projected picture has a width of 25 feet at a 100-foot throw, bringing the projector ½ inch closer to the screen reduces the picture width by only about 0.01 of an inch, an amount too small to be measured.]

While the *sidewise* movement of 4leg projector bases keeps the optical axis essentially parallel to its mean position, thus producing no visible weaving of the picture, the *forward*-

^{*}The tangent of an angle is one of the "trigonometric functions." The numerical value of tangents are therefore found in tables of the natural trigonometric functions. As an example, the tangent of a 25-degree angle (written tan 25°) is given by tables as 0.466. Similarly, tan $\frac{1}{2}$ ° = 0.00873.

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Burns 13.6 mm positive for either 35 mm or wide film projection systems.

New "cold" reflector removes approximately 50% of the heat from the beam before reaching the operture.

Light booster lens, potterns the spot to the size and shope of the aperture so as to efficiently utilize oll useful light. Lamphouse optical speed is equivalent to f 1.5, and when used with f 1.5/1.6 projection lenses and X-L projectors on 35 mm projection.

Heat radiotion to the projection booth is held to a minimum by the Heat Purger, a heavy duty, quiet centrifugol exhaust fan which removes products of combustion and heot. The New

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MOST POWERFUL PROJECTION LAMP EVER MADE

70% more light than most 18-inch reflector lamps. 51% more light with 35 mm film and an f I.7 lens. Projects 65,000 lumens for Fox CinemaScope 55 mm (1.340 x 1.06); 56,000 lumens for MGM 65 mm and Todd-AO 70 mm; 55,000 lumens for CinemaScope 35 mm (.912 x .715) and 46,000 lumens for small aperture 35 mm (.825 x .600). A new and totally different type of lamp. Requires 15-20% less power than any other lamp at a given carbon burning rate. A 10 mm x 25" non-rotating Ultrex positive carbon is burned with a rotating 7/16" x 12" solld graphite negative at 140 to 160 amperes and 70 to 78 volts. The 21-Inch reflectorthe largest ever used—Is designed for all film widths.

NATIONAL EXCELITE `135'' PROJECTION ARC LAMP

Outstanding and exclusive features built into both the Constellation "170" ond Excelite "135" include: Accommodation of full 20-inch corbon trim. Automatic croter positioning system which maintoins the tip of the burning carbon at the exact focal point of the reflector. Change of light color of the screen, caused by variotion in corbon burning rates, is absolutely eliminoted. Reor lomphouse door which swings completely out of the way to focilitate retrimming and lomphouse and reflector cleoning. Single odjustment controls the feeds of both corbons. Simplified spot focusing. The entire burner ossembly is movable so that the position of the are con be shifted for the best screen light without disturbing the relative corbon positions or equilibrium of the arc.



Burns 9, 10, 11 mm Regular and 10 mm Hitex Positives for all 35 mm systems.

NATIONAL THEATRE SUPPLY



NATIONAL THEATRE SUPPLY COMPANY . BRANCHES COAST TO COAST

and-back movements of loose supports usually involve a rocking motion that changes the direction of the optical axis through a sufficiently large angle to make the projected picture jump vertically on the screen.

Remedies for Base Unsteadiness

When the projector base itself rests upon a "bouncy" floor, the entire machine may rock under the impact of the projectionist's footsteps and other minor tremors. The best remedy, short of rebuilding the projection room upon a firmer foundation, is to cover the old floor with a layer of concrete at least 1 inch thick. This should be properly treated and painted after a curing period of several weeks, or completely covered with battleship linoleum.

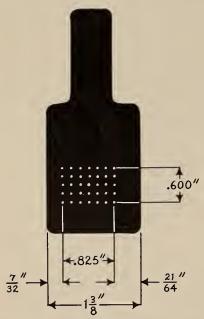


FIG. 3. A sheet-metal image-steadiness test plate which can be made by the projectionist. A few inches long, the plate has the same width as standard film (35 millimeters = 13/8 inches). A pattern of fine holes is drilled through the metal in the area occupied by one "frame." The plate should be placed over the aperture and focused sharply on the screen to detect image movements due to an unsteady projector base.

A formula we have used for flooring cement specifies 1 cubic foot of sharp sand and 1½ cubic ft. of gravel (max. particle size 3/8 in.) to each sack of cement. Mix with 4½ U.S. gallons of water per sack-batch if sand be wet,

or 5½ gals. water if sand be dry.
Unsteady bases pose a difficult problem, as the trouble usually lies in the
projection-angle adjustment pivot. All
legs and brackets, as well as the tilt

pivot, should be tightened as much as possible, and extra supports placed under the lamp table. These should consist of straight iron rods securely bolted by suitable hangers or brackets to the lamp-table rods and to the floor, one rod on each side of the machine. The only really satisfactory cure for base unsteadiness is, of course, the installation of modern bases.

Rigidity of Lens Mount

The rigidity of the lens mount in the mechanism is an extremely important factor affecting image steadiness, since any movement of the lens in a direction perpendicular to the optical axis results in a correspondingly large movement of the projected image. The amount of the picture shift is very nearly equal to the distance of lens shift multiplied by the projection throw (in inches) divided by the focal length of the lens. Thus for a throw of 100 feet (1200 inches) and a lateral shift of only 0.01 inch in a 4-inch lens, the entire picture moves:

$$s = 0.01 \times \frac{1200}{4} = 3$$
 inches.

Since a lens movement of only onetenth this amount—0.001 of an inch—will cause the picture to move 0.3 of an inch, any rapid vibration of the lens through this small range will blur the picture and literally erase the finer pictorial detail from the image.

The lens mounts of old projectors may have become sufficiently loose to allow the lens, itself, to vibrate when the machine is running. Now that lenses are interchanged very often in the course of a day's run, it is always a good idea to conduct a projection test for lens vibration.

Test for Lens Vibration

Place a metal focus-test plate in the film track of the projector gate. A test plate, commercially available for Ernemann projectors in foreign countries, can be made by drilling several fine holes in a strip of thin sheet metal a few inches long and exactly 35 millimeters (13/8 inches) wide, as shown in Fig. 3. Focus the holes as sharply as possible on the screen while the projector motor is running. An observer on the stage, by closely examining the magnified images of the holes, can easily detect any vibration that may be present.

Movement of the projected holes does not necessarily mean that only the lens mount vibrates. If there be no undue motor or flywheel vibration, however, lens vibration should be suspected. The soundhead flywheel, if

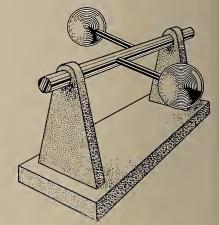


FIG. 4. A demonstration device to illustrate how a flywheel can produce machine vibration even though it is in perfect static balance. No matter how the shaft to which the two balls are attached is turned, it will balance perfectly. When the shaft is rapidly rotated, however, the generation of centrifugal forces in different planes will cause the device to vibrate violently. If prevented from vibrating by being securely fastened to a support, the oscillating forces will wear the bearings and create vibration of the shaft. This is "dynamic imbalance."

of the rotary-stabilizer type, is not a factor in this test because it does not revolve when no film is run. The lens mount should be readjusted if the focusing slide operates too freely or if the lens barrel is loose in the lensholder assembly when the clamp is tight.

Basic Causes of Vibration

Rapid vibration of a projector may be caused by either the motor and associated flywheels and drive gears or by the soundhead flywheel. Old-style, sound-sprocket flywheels are sometimes particularly troublesome, but even comparatively modern scanning-drum rotary stabilizers have been known to cause vibration. The projector mechanism, itself, is usually vibration-free; and no instance of troublesome intermittent flywheel or shutter imbalance has come to our attention.

The typical old-style soundhead having an internally damped flywheel on the sound-sprocket shaft is prone to vibrate at rotational speeds as high as its normal running speed of 360 RPM. In some cases injudicious repair



Scene from Don Hartman's Production DESIRE UNDER THE ELMS, starring Sophia Loren, Anthony Perkins and Burl Ives.

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Whether in black and white or color, "National" carbon arcs bring out all the realism Hollywood puts on film. The arc's color balance reproduces all the vivid hues of life-like color. Wide, wide screens show sharpness in every detail. For drive-ins, this brightest man-made projection light throws images hundreds of feet. And, indoors, picture brightness permits adequate house lighting.

These slower burning "National" Projector Carbons help cut operating costs: "Suprex" 7mm, 8mm and 9mm carbons — 10mm, 11mm and 13.6mm High Intensity Carbons.

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UNION CARBIDE has resulted in bending the shaft to which the flywheel and sound sprocket are attached. In addition to causing machine vibration, this defect produces "raspy" reproduction of the higher tones most noticeable in violin music and soprano voices. The indicated remedy is a new shaft.

This cause of machine vibration is actually the *dynamic imbalance* of rotating masses. Even though a flywheel may be attached to a shaft at its center of gravity, a bend in the shaft will cause the entire mass of the wheel to describe a small circle at each revolution. A similar effect is produced by a lop-sided flywheel. Either condition is a case of dynamic imbalance resulting from *static imbalance*.

More complicated is the case of a soundhead flywheel having an internal distribution of mass which generates vibration even though it is balanced statically. This state of affairs is illustrated by the demonstration device shown in Fig. 4. The two balls are in perfect balance, but they are displaced on the shaft with relation to each other. When the shaft is rapidly rotated, therefore, the generation of centrifugal forces in different planes creates dynamic imbalance and strong vibration.

Inasmuch as a defective rotarystabilizer flywheel or scanning-drum shaft induces vibration only when film is run, detection of the defect is a relatively simple matter. It is necessary only for an observer on the stage to examine the image of the aperture when the machine is run with and without film. The edges of the aperture, not the picture on the film, should be focused sharply in order to reveal clearly any vibration which may be present in the image.

This procedure does not work in the case of sound-sprocket flywheels driven through gears. If severe vibration caused by the flywheel is suspected, it may be possible in some soundheads to remove an intermediate driving gear or pinion and rotate the free-turning flywheel by hand while the aperture or a focus-test plate is being projected.

Vibration of Motors

Motor armatures or rotors are symmetrical in form, hence are dynamically balanced when the various masses of the pole pieces, windings, bolts, commutator or centrifugal switch, etc., are uniformly distributed. Slight static imbalances are by no means uncommon in carelessly constructed motors; and these will generate vibrations which may be felt through the motor frame.

The vibration is communicated to any machine to which the motor is attached, and the resulting vibration may be very severe. In fact, the writer has encountered motor vibration even in the most modern projection equipment. It is particularly disturbing to find strong vibration in one machine and none whatever in the other. A new motor is the cure.

Universal-Base Troubles

The soundhead and picture-mechanism drive shafts with their universal-joint couplings are possible sources of vibration in Western Electric universal bases, although the trouble more often resides in the W.E. sound flywheel and its shaft. Both the old-style controlled-speed motors for this type of base and the later "B-line" motors furnished by other manufacturers appear to be well-constructed, vibration-free units.

Front-drive soundhead motors sometimes create vibration through faulty flexible couplings; and when the vibration produces a directional oscillation in the projector, the effects can be detected on the screen. Although seldom used at the present time, a V-belt drive and a motor positioned as low as possible on (or in) the projector support is the most satisfactory arrangement as regards vibration-free operation.

Hand Test While Running

It is often possible to estimate the severity of projector vibration by holding a hand on the mechanism case while a film is being shown. A faint whirring sensation is normal and should not cause concern; only when the machine is felt to vibrate strongly is it necessary to take steps to evaluate the effects in the screen image and to locate and correct the trouble.

The projectionist should impress upon the exhibitor the necessity for firm projector supports whenever the purchase of modern mechanisms or heavier lamps is contemplated. We personally know of rickety old universal bases that are still doing service (and a distinct disservice to the welfare of the exhibition industry) even though the original Simplex Regular mechanisms have been replaced, successively, with Super Simplex, Simplex E-7, and, finally, more modern mechanisms!

Even if there were no other reason for getting rid of these battle-scarred antiques, we might point to the improvement in sound which would surely accrue from a replacement of 1928 Western Electric soundheads with post-war units.

Now, It Was This Way — In Five Languages

English	Spanish	French	Italian	German		
Cans	Latas	Boites	Scatols	Film-Buschsen		
Color print film	Pelicule positiva de color	Positif couleur	Positivo colore	Poeitiv-Farbfilm		
Frame	Fotograma	Image	Fotogramma	Bild		
Raw stock	Pelicula virgen	Pellicula vierge	Pallicole vargina	Rohfilm		
Release print	Copia de explotacion	Copie serie	Copia (di seris)	Verleih-Kopie		
Close-up	Primer plano	Gros plan	Primo piano	Gross-Anfnahme		
Aperture plate	Ventanilla	Fenetra	Finestrino	Bildfenster		
Lenses	Objetivoe	Objectifs	Obbiettivi	Objektive, Linsen		
Power supply	Fuents de poder	Source d'energie	Alimentators	Stromgerat		
Socket	Zocelo	Douille	Zoccolo	Sockel		
Splicing machine	Maquina de empalmar	Colleuss	Giuntetrice	Klebe-Vorrichtung		
Trailers	Coles de propegande	Filme-announces	Presentazioni	Trailer, Vorspannen		
Projection room	Sale de proyeccion	Salle de projection	Sale di proiszions	Vorfuehrraum		
Main Titlee	Titulos de presentacion	Generiques	Titoli di testa	Haupt-Titel		
Subtitles	Titulos sobre-impresos	Sous-titres	Sottotitoli	Untertitel		

Gleaned from an extensive glossary of motion picture terms as she is spoken in various quarters of the film firmament are the appended expressiones, or what have you, which should serve you well when you next run a foreign film. From a compendium by Carlos Connio Santini for the Society of Motion Picture & Television Engineers.

Perspective With a Purpose

By HARRY WALTER

Apparent perspective has special applications not only in motion picture photography but in all forms of pictorial composition, as is so lucidly set forth in the appended article which appeared originally in American Cinematographer.

PERSPECTIVE IS DEFINED in Webster's Dictionary as "The appearance to the eye of objects in respect to their relative distance and positions"—which is as good a point as any to start a discussion on perspective as it relates to cinematography.

Because a thorough knowledge of perspective can greatly influence a cinematographer's ability to achieve impressive pictorial composition in scenes, the subject rates along with exposure, depth of field, film emulsion characteristics, etc., for special study.

In addition to being a geometrical question, the appearance of perspective in a picture is also a psychological one. Perspective is altered chiefly through the use of lenses of appropriate focal length. One of the most common examples today is the way certain lenses are used in photographing automobiles for magazine ads or for TV commercials to enhance and emphasize the long, low lines that characterize 1958 models.

Different Lenses, Distances

Considering the geometrical aspect of perspective, let us take for illustration the outline of a cube, Fig. 1. A side elevation is represented by A-B-C-D. If this cube is photographed with a lens. say of 1-inch focal length, the result is that the horizontal lines of the cube will appear at c-d-a-b (top diagram) and the photograph will appear at P.

Repeating the experiment with a lens three times the focal length (i.e., a 3-inch lens). in order to obtain a photograph of the cube so it appears the same size as when photographed with the one-inch lens, it will be necessary to set up the camera three times as far away; the result will be shown at Q in lower diagram of Fig. 1.

It will be seen that the lines in the photograph Q representing the edges or outline of the cube are now much closer together than in the photograph P. This illustrates in a simple way why the distances between objects appear to be less

when a scene is photographed with a telephoto lens.

Two men standing, one a few steps behind the other, will appear to be standing close together when photographed at a distance with a long focal length lens; but if photographed at closer range with a one- or two-inch lens, they will appear in the picture in approximately the same relationship as they actually were when photographed (see Fig. 3).

In the same way, the effect of perspective induced by specific lenses will influence the way scenic or compositional elements will appear. The landscape beyond a foreground of trees in a scene will appear to be further away when photographed with a wide-angle lens than when shot with a 3-inch telephoto lens.

Still, this phenomenon is not the whole story. Look again at the resultant pictures P and Q in the illustration of the cube in Fig. 1. If these diagrams had been placed before you without any explanation, what would you have made of them? One might perhaps imagine both to be pictures of cubes; but P might be misinterpreted as a truncated

pyramid while Q might be imagined a flat plane with bevelled edges. Or again, they might be considered nothing more than a pattern on paper.

The fact is that when solid objects are projected onto a flat surface the eye and mind cannot perceive any idea of solidity or size of the object without the exercise of imagination and reference to the sizes of known things. Consider the photographer who is shooting a picture of a tall cliff and places a man besides the cliff as a visual means of comparison. Without this reference the resultant scene might easily he mistaken for a miniature.

Consider again the instance of the two men, one standing slightly behind the other, as shown in Fig. 3. But first refer again to Fig. 1 and imagine B-C is the nearer man and A-D the farther. Photographing the two men with a long focus lens, the resultant image will be something like F in Fig. 3, with the man at the rear appearing about three-quarters the size of the man ahead of him.

This illustrates how perspective and the use of the right lens can be employed in a scene to put emphasis on a certain character or to diminish the aspect of another for dramatic emphasis or any other reason. By photographing the same men in the same position with a lens of shorter focal length, the man at the rear will appear about one-half the size of the man in front, as shown at G in Fig. 3. (Note how this result compares with that at point a-d and b-c in Fig. 1.)

Longer Focal Length Result

To consider further, suppose now that with the camera in the same position as when photographing the two men in G, Fig. 3, a lens of longer focal length is used. The result will be as shown at H. While the relative sizes of the images of the two men will be in the same ratio as in illustration G, both will appear much larger. In still photography

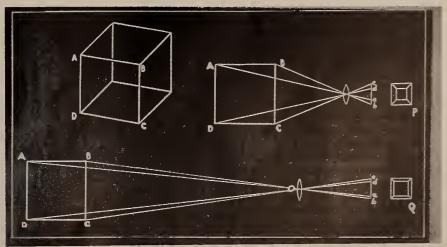


FIG. 1. Diagrams show effect on perspective when an object—a cube—is photographed with a one-inch lens (top) and a three-inch lens. Resultant pictures are represented at P and Q.

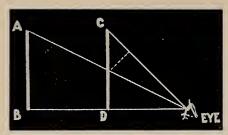


FIG. 2. In looking from one point to another the eye swivels in its socket and the extent of eye movement affects one's judgment of distance.

the same result could be attained by enlarging the picture G.

After studying the results of using three different lenses to get the images F, G, and H, the reader will agree that the two men at G appear to be standing farther apart than at H. This is a peculiarity (the more distant objects in the picture appearing to have come nearer) you can test for your self. The small still camera snapshot is notable for the way it exaggerates distance.

This exaggerated effect can also be demonstrated by holding a photograph before you, then gradually bringing it closer to one eye. The effect of changing perspective becomes more apparent when the picture gets very close to the eye, and in this position a magnifying glass (short-focus lens) must be used to keep the picture in focus. And the nearer the picture is moved toward you, the less appear the separation of planes within the picture.

A Means of Reference

Why is this? When you see the picture on paper you cannot readily determine the exact size of objects with the scene without some orienting object of known size also being there as a means of reference.

In the example in Fig. 3, we have a picture of two men (H). We know the size of the average man from experience but we do not know how much the two men are separated in the picture. So the eye instinctively jumps the gap and tells us that the second man, whose image registers a certain size on the eye's retina, must therefore be so many feet distant from the first. The eye regards the nearer man as ten feet away, and, as the farther 'man appears half the size, he must be approximately twenty feet farther back. (Actually, they are but ten feet apart.)

Now if we consider example G and regard it from the same distance as the other, the image of the nearer man will appear to our eye about the same size as the distant man in example H. But since in the smaller picture the distant man registers about half-size on the eye's retina, we therefore assume he must be about 40 feet to the rear of the first

man. The distance between the two men thus appears to have increased, although both photographs are geometrically correct. The distances given are, of course, for the purpose of explanation and are quite arbitrary.

The Idea of "Constant Size"

The explanation given here is a variant of the psychological idea of "constant size." When the eye receives images of different size, it does not regard the objects as being of normal or smaller size. It assumes that they are of similar size and that one is farther away than the other—the measure of the distance being governed by experience.

Psychologically, in order to see a picture in correct perspective it is therefore necessary that the images reaching the retina of the eye be of the same size—the same as they would have appeared if the eye had observed them from a position alongside the camera that photographed them. This can also be done where the picture is viewed at a distance equal to the focal length of the camera lens.

Where the picture is enlarged, as on the motion picture screen, the viewing distance becomes the focal length multiplied by the magnification factor of the enlargement.

While this rule is broadly correct, it is not the whole story, as will be found from personal observation. The eye and the camera lens do not work in exactly the same way. With the eye, the size of the image on the retina changes as the focus of the eye changes. With the camera, while the lens remains stationary,

with an all-embracing vision, the eye sees clearly only one point at a time. In looking from one point to another within a scene or vista, the eye must swivel and the extent of the eye's movement must have some effect on the judgment of distance.

A rather extreme example is illustrated in Fig. 2. Here A-B is twice the distance of C-D. But the eye does not turn in the arithmetical ratio of 2-to-1, for the angle A-E-B is more than half that of C-A-D.

Application to Moving Objects

Apparent perspective has special applications in cinematography where we are dealing not with still objects at set distances so much as with moving objects. We have seen how a long focal length lens compresses the appearance of distance. Therefore an object moving forward across that distance will appear to travel more slowly than normal. A familiar example of this is a newsreel shot of race horses coming down the home stretch where the horses, even though running at top speed, appear to make slow progress toward the wire.

Conversely, where it is desired to exaggerate the speed of an object moving forward from the rear of a scene, such as an approaching train, the effect can be gained by using a short-focus lens on the camera. The effect is sometimes enhanced further by undercranking the camera.

As stated previously, the matter of perspective in a scene or picture is—in addition to being a geometrical question—also a psychological one.

FIG. 3. Showing how apparent distance between two objects is altered by the simple expedient of using lenses of different focal lengths. F represents result with a medium long-focus lens. G is result when using lens of shorter focal length; while H represents greatly enlarged images secured with a telephoto lens.

Projection CLINIC

Heat on Film Cause of Focus Troubles

UDGING FROM our mailbag, complaints anent CinemaScope print focus are on the increase. A recent advice on this topic, typical among scores, is one from the State Theatre in Starksville, Miss., which refers to the Richard Mahoney (Wethersfield, Conn.) query in our "Letters" section for February last (p. 20). Our Mississippi friend writes, in part:

"Was most interested in the R. C. Mahoney bit about his difficulty in focusing CScope film, since I have about the same setup: we use Simplex X-L projectors, Peerless arclamps, and B. & L. lenses, pulling about 60 amps.

Magoptical Prints Most Difficult

"Most of my trouble is with 20th-Fox magoptical prints. At the changeover the print is wholly out of focus, with immediate adjustment of the lens a 'must'. Then during the running of the reel I must refocus four or five times by gradually letting the lens in toward the film. I have no such trouble with 'straight' optical prints. Could this trouble be caused by the magnetic tracks on the film?

"We recently finished running "Sayonara" (Technicolor) which had the clearest photography I have ever seen on a CScope print. It was easy to focus and it stayed in focus, not being too much out even on changeovers.

"I read recently that Todd-AO projectors have an automatic focusing device. True?"

The causes of focus drift reside in the film and in the lens. As far as the lens is concerned, the absorption of heat by the glass causes it to expand. This changes the curvature of the lens surfaces by a very slight amount and ac-

A British Mitchell Fan

Considering Robert A. Mitchell's Manual of Practical Projection, it is difficult to think of any aspects of projection and technical showmanship that is not dealt with in a thoroughly practical manner. This is . . . no mere reprints of manufacturers' data . . . with a really excellent index.

H. HOWARD CRICKS

Editor, Technical Section, The Ideal Kinema, London, England

See back cover.

cordingly alters the focal length.

As a rule, the lens must be brought slightly closer to the aperture as the projection of a reel of film progresses.

There is considerable evidence, however, that the film itself is the most important factor in focus drift. This has been especially true since the use of acetate film, for this type of film base is more readily warped by heat than the old inflammable nitrate film. In addition to having a greater rigidity than acetate "safety" film, nitrate base retains its rigidity up to the high temperature which is likely to ignite it. Acetate film, on the other hand, softens when warmed and buckles very readily.

Magnetic Striping Contributory

It is very likely that the presence of magnetic striping along the edges of acetate film on the base side results in an excessive absorption of heat by the film base by conduction from the hot tension pads of the gate. The absorbed heat causes the film to buckle; and the degree of buckling will be greatest near the end of the reel when the projector is the hottest.

Since the gelatine emulsion produces a negative buckle, pulling the center of the frames toward the lamphouse, any increase in buckling caused by shrinkage of the edges of the film will necessarily assume a negative direction. The lens will then have to be moved nearer and nearer the aperture to follow the slow movement of the film in the direction of the lamphouse.

Acetate vs. Nitrate Film

It should be borne in mind that the gate tension pads may produce this kind of film-warping in acetate film even when they have a relatively low temperature. Temperatures too low to produce significant deformation of nitrate film will buckle acetate film severely, particularly if the absorption of heat is aided by a cemented layer of heat-conducting magnetic oxide.

In the light of these factors, and with the film itself the main cause of the out-of-focus trouble, there would seem to be no present possibility of any "automatic" focusing device.

Anti-Vibration Material

FROM CERTAIN quarters have come endorsement of foam rubber as a supporting material under projectors. Informed opinion holds that it is not. Rubberand-plank beds for generators are excellent absorbers of vibration; but possible movement of a non-optical device is of no consequence.

A layer of rubber between a machine and the rigid supporting floor kills vibration by (1) isolating and confining the vibration to the machine itself, and (2) dissipating vibration in the resilient material.

The problem of vibration-proofing a projector is difficult because the machine must be anchored to the rigid floor to prevent vibratory movements of the projected images. In other words, the projector must rest upon the hard floor, or, at least on nothing more "bouncy" than

[This topic is discussed in detail in "Machine Vibration and Image Steadiness (p. 5, et. seq.).]

Metal Screen "Corrugations"

THE INCREASING use of metallized screens in drive-in theatres has induced many questions from the field, probably the most common being that relating to the reason why such screens are "corrugated". Typical comment: "It would seem that these 'grooves' have no other purpose than to collect dirt."

This notion is far wide of the mark. If the screen surface were smooth, it would act like a mirror, with all light being reflected in one direction only while the sides would remain dark. The corrugations produce the necessary lateral dispersion of the light.

The Engineers, Too

This is a practical, concise and very useful book . . . well organized, well cross-indexed in a comprehensive manner . . . with down-toearth suggestions to improve the daily projection routine.

RALPH H. HEACOCK

Writing in the Journal of the Society of Motion Picture and Television Engineers.

See back cover.



Roving Guns will settle in Row One

WEEK IN, WEEK OUT, millions of kids drop their guns and make a dash for the neighborhood picture house in search of adventure and escape—to thrill to well-told tales! What's more, the better the picture; the more they come . . . AND THE BIGGER THE BOX OFFICE.

Technics are an important part of making better pictures. In fact, in this area, as in all matters of production, processing, distribution and projection, the Eastman Technical Service for Motion Picture Film can prove of great help. Offices are strategically located and inquiries are welcomed.

Motion Picture Film Department EASTMAN KODAK COMPANY Rochester 4, N.Y.

East Coast Division
342 Madison Ave., New York 17, N.Y.

Midwest Division
130 East Randolph Drive, Chicago 1, III.

West Coast Division
6706 Santa Monica Blvd., Hollywood 38, Calif.



In The SPOTLIGHT

The function of this department is to provide a forum for the exchange of news and views relative to individual and group activities by members of the organized projectionist craft and its affiliates. Contributions relative to technical and social phases of craft activity are invited.

UR brothers in arms, financially speaking, the Theatre Owners of America, recently bestirred themselves to ascertain where the admission dollar went. The tabulation covered some 500 theatres including first- and subsequent runs, a few "art" houses and "specialized" situations, and was released to the trade press under the generalized heading of "Film Theatre Wages at 29%."

It follows, of course, that this generalization was immediately translated in some quarters into terms of projectionist and stagehand wages. The latter craft does not figure importantly except in large first- and subsequent-run situations. A close look at the breakdown of costs, elsewhere on this page, shows that the projectionist-stagehand rap does not pan out.

Taking the total wage figure of 29% at its face value (and IP does) it is noted that it includes "total operating labor expenses"—management, projectionists, stagehands, cleaners, cashiers, ushers, and what have you. Subtracting the

Theatre Operating Breakdown (Film Not Included)

	(111111	1401	mcruueu)	
Item				Percent
Shipping	film			1.2
Newspap	er ads			3.7
			• • • • • •	
_				

5.8% "management" cost from the 29% total we wind up with a 23.5 figure for all the aforementioned categories. One may safely bet his homestake that the projectionist share of the latter figure is at the very outside just a trifle above that of management, that is, 5.8%.

This puts a different tint on the picture overall, and it really approaches a very low level when it is realized that a theatre has absolutely nothing to sell until it is translated into merchandise via the projection process and results in a visual image on the screen.

- The American Arbitration Ass'n awarded \$895.15 to Los Angeles Local 150 in full settlement of its claims against Los Feliz Drive-In Theatre, Inc. The controversy arose over the exhibitor's refusal to pay first-run wage scale for projectionists in the showing of "The Rose Tattoo" and "Court Jester," contending that these pictures previously had been showcased and therefore were not first-run. Local 150 showed that both films were exhibited at the Los Feliz day-and-date with local first-run theatres. A clause stipulating that exhibitors must pay first-run scale to projectionists when pictures are showcased and later released as multiple first-runs is included in the Local's conventional contracts.
- The long drawn-out contract negotiations between IA Local 299, Winnipeg, Man., Canada and Famous Players have been satisfactorily concluded with the signing of a new two-year contract, with all conditions retroactive to January 1, 1958. Among the conditions agreed to are weekly increases, ranging from \$2 to \$5 per man in all F-P theatres: Uptown, Tivoli, and both Brandon Theatres, \$2; Gaiety, \$2.50; Flin Flon Theatre, \$4; Brandon Drive-In, \$4.25 for the first year with an additional \$4.25 for the second year; and Portage la Prairie Theatre, \$5.

Manpower at the Capitol and Met Theatres to be reduced from eight to five men, with each of the latter to receive an increase of \$7.50 per week, plus an additional \$5 per week hike when the projection room manpower is further reduced to 4 men, based on one-man-per-shift.

The company also agrees to contribute an amount equal to 5% of each man's salary to the Local's pension fund. In addition, all men employed by F-P for one or more years will receive two weeks annual vacations with pay; men with 15 years or more service will receive three weeks annual paid vacations, and those employed for 25 years or more will be entitled to four weeks.

- Following the recently concluded agreement between Winnipeg Local 299 and Canadian Famous Players, Earl Ross, charter member of the Local, will become eligible to receive the company's \$75 monthly pension, plus hospital and medical benefits, upon his retirement this month from his job as projectionist at the Capitol Theatre.
- The 31st annual convention of the Union Label and Service Trades Department of the State of New York, AFL-CIO, will be held at the Manger-Seneca Hotel in Rochester, N. Y., May 26-28. A highlight of this show will be an elaborate public display of union-made products shown under the auspices of the New York State Labor-Management Exhibit, which will be held in conjunction with the Union Label convention.
- The Screen Actors Guild has won an important judgment in Los Angeles Superior Court, upholding the validity of the Guild's collective bargaining agreement providing for residual payments on reruns of television films and confirming other principles of interest to all unions.

The judgment in the amount of \$4,510.61 plus costs, was handed down against Telemount Pictures, Inc., Mutual Television Productions Inc., and Telemount-Mutual. The Guild had sued for the money as rerun fees due 11 members who appeared in various episodes of the "Cowboy G-Men" film series.

Telemount's legal defense contended the Guild contract violated both federal and state anti-trust laws, that actors' rerun fees should not be considered as wages and that, in any event, the Guild in filing this suit was acting as a collection agency without being licensed as one.

The court over-ruled Telemount's defense on all points, holding that actors' rerun fees paid under the Guild's contract are wages, that such fees are not in restraint of trade, that the contract does not violate the anti-trust laws, and that when a union collects monies for its members due under a collective bargaining agreement, such action does not make the union a collection agency subject to license.

[Who says IP was kidding when it discussed this topic in "Monthly Chat" for February?]

• Here is an airmail contribution by one of our fellows from Australia-Reginald Stewart, projectionist, Orana Theatre, Wangaratta, Victoria. Enclosing a clipping from the Melbourne Age which reflects the views of its film critic, Colin Bonnett, Mr. Stewart writes: "This is all the more remarkable because it coincides with IP's oft-expressed views. IP is always very welcome out here."

Excerpts from Mr. Bennet's review of a recent CinemaScope picture M-G-M's "Don't Go Near The Water," follow:

The comedy is so casual and its attractions so widely spread out that one looks for explanations deeper than the script. The answer, I think, lies partly in CinemaScope again-this medium which has helped to cut the proportion of good Hollywood films by half.

Of course, the novelty of it is off sooner for the critic than for anyone. To him, several all-star, Technicolored, stereophonic spectacles a month mean they all begin to look exactly alike, from farce to tragedy. But it is conceivable that the public tires, too, of the look of sameness that stamps the wide-screen technique. . . .

Past masters of the cinematic art concentrated on the relationship between each "shot" and their linking into single images in the mind. And so on. They called it the foundation of film art. Now, on the widest screen, these unique properties of film go largely by the board. Visually stunning effects are confined to the outdoors. Mentally stunning effects are lost. . . .

Much better to fall back on the stage again, for a stagey medium. Back to the days of Sarah Bernhardt miming Queen Elizabeth before a static, endlessly turning camera. If C'Scope grips us. it's the scenery, or the story-anything but the way it is put together. And nothing so cumbersome as this camera-and the editing technique that goes with it-can grip us for ever.

"Big" Pictures No Answer

The moguls themselves may finally be waking up, despite all the blockbusters with the two-sessions-daily and the bumped-up prices. "We decided not to make this picture wide," a man of the industry told me solemnly the other day; "we decided to make it good." And at the same time comes the call, also from the commercial side, for "better pictures" as the only ultimate answer to TV. Quite logically, these two points could be merged in the mind of the industry.

It could be fashionable again, before long, to think that orthodox shapes mean better pictures and better pictures need orthodox shapes. The reason given would probably be vague, but the result would be the same. The new posters would go up: "Sec it on The New NARROW SCREEN, with The New FLAT SOUND."

- The New York State Ass'n of Motion Picture Projectionists will hold its 1958 Spring meeting at the American Legion Home on West Main Street, Batavia, N.Y., on Monday, May 19. The afternoon session will start at 2 p. m.
- St. Louis Local 143 held its Golden Jubilee celebration in the Gold Room of the Sheraton Jefferson Hotel on Monday. March 10. The party, which started at midnight, was attended by more than 300 persons, including a number of topranking IA officials. Herbert Butz, president of the St. Louis Local, presented 50-year diamond rings to 10 veteran members. The recipients of these rings were William F. Canavan, the only liv-

ing past IA president, George O'Rafferty. A. P. Petill, Roy Anderson, Charles Serkes, Joe Schrempp, Roscoe Hawkins. Clay Tabler, John Kahl, and Fremont Noertemann.

Among the invited guests at the celebration were IA President Richard F. Walsh, Walter F. Diehl. assistant IA president; Harland Holmden, General secretary-treasurer; LeRoy Upton, IA 8th vice-president; Dudley McCann. president, and Hugh James, president emeritus, of the Missouri State Organization of the IATSE.

· Our good friend John Dorn, of Amsterdam, N. Y., sends along a few cigars with the announcement of the birth of a son, Lynden-on January 2 last! Congratulations, John. and thanks for the cigars-but where have you been and what have you been doing since Jannuary 2???

LaVezzi's 50th Anny in Precision Parts

FIFTY YEARS ago in a small shop on Chicago's North Side there was launched an enterprise which in the interim through integrity and technical skill richly deserved its tagline as a "manufacturer of precision projector parts." The founder of this one-man shop was Edward W. LaVezzi; the name of the shop is LaVezzi Machine Works, which is managed today by his sons Thomas and Robert.

With very little capital, even for those days, Edward purchased several used machine tools and started to make projector parts and a few other items that were new to that period, among which were automatically-propelled lead pencils and spark plugs for gasoline engines that could be cleaned at the spark gap by pressing a plunger on the dash-

In those early days film sprockets were made of brass and were not too precise. The first LaVezzi venture was a service to dealers by which worn brass sprockets were reworked. The brass teeth were machined off and steel rims pressed on; these were then machined and the teeth cut. The process was the forerunner of

the all-steel sprocket, to be followed later by hardening and grinding as the need for greater accuracy became apparent.

Remember These Mechs?

Projectors then in use included the Powers, Optograph, Edison, Vitagraph, Standard, and Pathe; and the stars, cams, sprockets, and other parts were produced for these mechanisms. Compared with today's standards the work was crude, but it was a remarkable achievement in the light of the equipment available. In fact, the task was largely handwork.

Today the LaVezzi plant is housed in a modern one-story building which was built specifically for the highly specialized work being performed therein. In addition to manufacturing precision parts for 35-mm projection units, La-Vezzi also produces machine parts of extremely high quality for cameras, delicate instruments, aircraft components, missiles, etc.

The achievements of the LaVezzi company over the past 50 years is perhaps best reflected in the unquestioning acceptance accorded its products by varied industries.



Robert V. LaVezzi



Thomas E. LaVezzi

AERIAL RECONNAISSANCE photography has gotten a boost from a camera developed by Eastman Kodak. From two miles it can detect details of black-and-white contrast blurred by haze, can tell best filter-film combinations for recon' photos. By dialing proper filter settings on the nine-foot long camera, researchers can find best wavelengths of radiant energy (visible and infrared) for piercing haze.

AUDIO · VISUAL

EDUCATIONAL • INDUSTRIAL • COMMERCIAL

New Advances in Kodak Pageant Projectors

THREE NEW features which offer added durability and a 16% increase in screen brilliance for the 1958, 15-watt Pageant sound projector have been announced by Eastman Kodak Co. Model AV-154-S, Type II. incorporates a specially-designed, tungsten carbide pulldown tooth; 1200-watt lamp capacity, and a three-wire cord with two-prong adapter plug.

Prototype of the new tungsten carbide pulldown tooth was subjected to 2000 hours of constant wear at Disneyland's Main Street Nickelodeon exhibit, with negligible evidence of wear. Kodak points out that the Disneyland test run was roughly equivalent to four to five years of professional or school use.

Pulldown Tooth Durability

Pulldown tooth durability is important because of the constant wear—the claw engages the film 16,000 times during a single 400-foot reel—on this part of the projector. A unique manufacturing method is employed to assure trouble-free operation of the new pulldown tooth. The tungsten carbide tooth, itself a part of the punch tool is "swedged" into sheet metal stock so that it cannot work loose. The new projector's 1200-watt lamp capacity makes possible a 16 percent increase in screen brilliance, particularly valuable for auditorium use or difficult "theater" conditions.

The Type II Model Pageants also accept 1000- and 750-watt lamps, enabling



Kodak Pageant sound projector, Model 8K5.

the user to match desired illumination levels with projection conditions. For example, by using a 750-watt, 25-hour lamp with the Kodak Super-40 Shutter on the Type II projector, the user obtains the same level of light produced by a 10-hour, 1000-watt lamp in combination with a conventional three-blade shutter.

Also supplied with the new model projector is a three-wire cord with twoprong adapter plug. The three-wire cord is expected to be particularly valuable in those areas where municipal codes require an additional grounding wire for projectors.

Additional details from Audio-Visual Dept., Kodak, Rochester 4, N.Y.

Film vs. Tape Versatility

The following is by Saul Jeffee, founder 28 years ago and president of Movielab, largest privately-owned film laboratory in the U.S.

A VAST expansion of the use of motion picture film is under way just as a supposedly competitive medium, video tape recording, makes its big-time TV debut. The principal advantage of film, plus the fact that a motion picture camera can go anyplace without electronic hookups or power sources, is that once a picture is on film it can be used in any pictorial medium. It can be shown on TV, on a theatre screen, in a clubroom or on a home-movie projector—and it can even be reproduced on the printed page.

In fact, if anybody cared to, he could even use film to provide the picture for video tape recording; but before a taperecorded picture could be shown on a theatre screen, for example, it would have to be transferred to film.

Film Range Impressive

One of the most significant aspects of the recent growth of the motion picture processing industry has been the direct result of film's versatility. This is particularly true of color film because with color footage one can get either blackand-white or color prints of top quality. From a single can of negative nowadays it is possible to derive TV, theatre, industrial and public relations material, and even after that there is sometimes further value as stock-shot footage.

Nothing will replace film. With the amount of pictorial material that will be required in future communications, there is plenty of room for tape and film, each doing the jobs it does best.

Closed-Circuit TV Costs

Why ISN'T there more closed-circuit TV? This was the provocative question that Donald M. Krauss of General Electric Co. posed to the recent SMPTE convention in Los Angeles.

Mr. Krauss cited the prohibitive cost of transmitting TV signals over long distances as the most important factor. At full TV bandwidth the annual cost for transmission facilities over a 500-mile run might come to about \$400,000, he said. This is startling when it is realized that the pick-up and display equipment used with this facility might cost less than 1% of this figure.

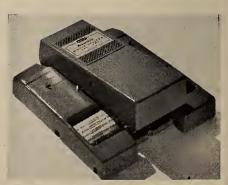
As a solution to the problem of cost, Mr. Krauss advocated the use of a narrow-band TV signal. It was cautioned however, that the narrower the band signal became, the greater the loss of resolution and of continuous motion. The exhibitor would have to determine how much depreciation in picture values the customer would tolerate.

Using slides, Mr. Krauss then described one method developed at G.E. for sending signals over narrow-band TV. He emphasized that this suggested system was only a starting point and was open to improvements and modifications contingent upon the development of new equipment.

Kodak Presstape Splicer Locks Sections of Film Together

A NEW movie-making accessory that makes quick, dry and interlocking splices on 8- or 16-mm movie film has been announced by Eastman Kodak.

As a dry splicer, the new accessory



The new Kodak Presstape movie splicer makes quick, dry and interlocking splices on either 8- or 16-mm movie film. It is supplied with a quantity of adhesive-backed Presstapes.

works this way: The splicer cuts a unique notched section out of one frame to be spliced and a corresponding section out of the other. Then the two pieces of film are fitted snugly together. A strip of backing is stripped off the adhesive on one of the perforated Kodak Presstapes that come with each splicer, and the adhesive side is placed on the film. In moments after a Presstape has been placed on each side of the film, the splice is secure and the film ready for showing.

During the splicing operation, two finger hooks on the splicer anchor each piece of film in position. The Presstape—itself perforated like a piece of film—can be accurately placed on so that sprocket holes stay in register.

This new Kodak Presstape Splicer comes with ten 8-mm and ten 16-mm Presstapes. List price at Kodak dealers is \$6.95. Additional packets of 20 Presstapes are listed at \$.50 for either size film.

New Slide Previewer

A NEW slide previewer and sequence editor has been introduced by Pictor, a division of Mast Development Co., in Davenport 1, Iowa. The unit's dimensions, in inches, are 12 long, 8 high and 8 deep. It can be used to edit displays and compare twenty 2x3-inch slides at one time on an acrylic plastic viewing screen that provides evenly diffused daylight-blue illumination, the light source being an ordinary 40-watt lamp operating on 110 volts.

An even diffusion of light with no visible filament is obtained, and the unit is safe for all color slides with a 35-degree maximum rise in temperature. Price: \$12.98.

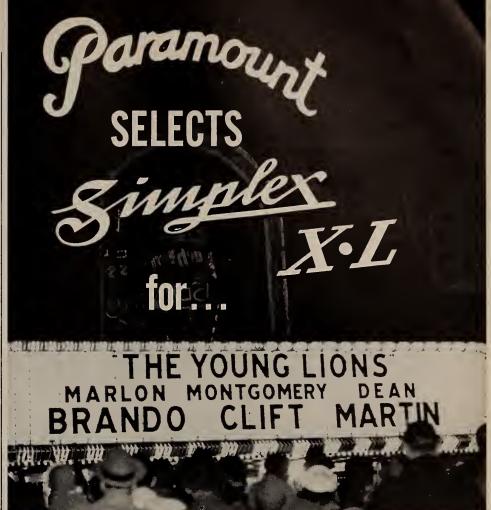
Graflex-Craig W. Coast Deal

CRAIG CORP., of Los Angeles, San Francisco and Seattle, has assumed, effective April 1, the distribution and service responsibilities for all Graflex audio-visual products in the seven Western states, Graflex, a GPE subsidiary, is a frontrank manufacturer of photographic, audio-visual and electronic equipment.

Included in the deal with Craig, a leading West Coast photo house, are SVE Schoolmaster projectors, record players and related equipment, and the Ampro line of 16-mm movie projectors and tape recorders.

Zone Numbers, Please

New and renewal subscribers to IP are urgently requested to include zone numbers in their addresses. A zone number is an integral part of an address, it makes for faster service, and it helps Uncle Sam's Postoffice.



Better Projection Pays!

That's why one of America's most famous theatres the New York Paramount—selected Simplex X.L projectors when it re-equipped for "The Young Lions".

Better *projection* comes from a better *projector*. And there's no finer projector being built than today's Simplex X.L. Here is the mechanism that's years ahead of the field. The only projector offering such exclusive features as a new *HI-SPEED* intermittent movement that gives more light at less cost and a new curved film gate that solves the problem of film buckle.

Little wonder, therefore, that whenever and wherever theatres select equipment—small town theatres as well as the huge Paramount—the choice is



NATIONAL THEATRE SUPPLY COMPANY - BRANCHES COAST TO COAST



Lens Focus-Drift

To the Editor of IP:

I am working with Todd-AO projectors (35-mm now) in an air-conditioned projection room, with very short focal length lens and a small-aperture wide screen. We are using Ashcraft Super Cinex lamps at 140 amps with heat filters. This is an indoor theatre with a short throw.

As you know, the Todd-AO has a massive holder and adapter for a 35-mm lens. I believe that by leaving the mechanism doors open and reducing the heat on the lens holder and adapter I am able to carry away some of the heat and thus effect a reduction in focus drift. In fact, the focus seems to remain fairly steady throughout a 38-minute reel. We use port glasses, of course.

Could this be true?

THOMAS W. RICH

Corpus Christi, Texas

COMMENT: The focus-drift problem mentioned here is quite common, especially in installations employing high arc currents with modern "fast" lamps. You are certainly getting a lot of heat on the film and the lenses from a 140-amp. arc even with heat filters. As you know, focus drift is worse with short-focus lenses; and any expedient that seems to help, like leaving the mechanism doors open to ventilate the lenses, is a good idea.

Another projectionist wrote in recently about focus drift being worse with "magoptical" prints; and in that case, the conduction of heat from the gate pads to the edges of the film seems to be a factor in increasing the tendency of ace-

tate safety film to warp and buckle.

Since you have been operating for 25 years, you undoubtedly recall how much easier nitrate film could be focused—and kept in focus. This was true, I think, even when condenser lamps pulling 180 amps. were used.

Progressive Acetate Buckling

Acetate film softens very readily when warmed, and since a projector is hotter at the end of a reel, the degree of buckling is progressively severe from start to finish. The fact that the layers of film have a smaller diameter close to the reel hub is also significant.

One projector manufacturer, however, blames the lens for focus drift more than the film. I cannot entirely agree, although it is known that lenses expand and usually shorten slightly in focal length as they get hotter. Perhaps the division of blame between film and lens varies from reel to reel; but in any case, cooling the lens will probably reduce the amount of focus drift, as your own experience indicates.

Movietone Black Ink

To the Editor of IP:

Have just finished reading Manual of Practical Projection, by Robert A. Mitchell, and I am sure that I am only one of many who feel that this is the best practical aid for projectionists ever published. I have urged our Free Public Library to add this title to their list.

Included therein is a reference to "Movietone Black Ink" for use in blotting

out unnecessary cue marks, scratches, etc., in the film. Where may one purchase this? One of our local art stores has a "Acetone Black Ink," but they do not recommend it for the purpose suggested.

GEORGE R. SMITH

New Haven, Conn.

COMMENT: Praise for the Mitchell Manual is now the usual thing, but none the less welcome. There would seem to be no reason why all theatre equipment supply dealers would not stock Movietone black lacquer; but failing this, it can be made up by dissolving enough methyl purple powder in film cement to color the cement black. A bit tedious, this, and much more convenient to buy it ready-made.

Film Features on TV at 'Point of No Return'

Looming directy in the path of TV stations is "the point of no return" with respect to the supply of theatrical features for TV was the grim warning by Oliver A. Unger, president of National Television Associates to the recent convention of the National Association of Broadcasters.

Citing the fact that TV has now consumed the initial exposure value of some 8000 to 9000 features, and that only re-runs of these films will be available in quantity in the near future, Unger stated his conviction that there will not be many more films coming from Hollywood in the years to come. Unger then got down to cases.

"There are," he said, "two rather obvious reasons for this: One is that the rate of replenishment even if all the films being produced were made available, is nowhere near the rate of consumption; and second, the myriad problems that the motion picture producing companies have with the unions and guilds in connection with the playing of these films on TV are as yet unsolved.

"Tremendous pressure has been brought upon the producers not to release any product beyond the 1948 cutoff and while ultimately it is more than likely that many of these pictures will be made available, it is not likely to happen for some time.

TV's Voracious Film Appetite

"If Hollywood were to release to TV every film produced from 1948 through 1957, an event not likely to take place, this would augment the current supply by a total of about 831 films. If the same rate of consumption that has taken place on the 8,000 or 9,000 films already made available to TV was to continue, these additional films would be consumed in short order.

"The manner in which both distribu-



Milano Via Borghetto 5

tors and exhibitors have dissipated the enormous value of feature films on TV has been like a drunken sailor spending his money on leave."

With features becoming scarcer and eventually much more costly the only solution that Unger could see was for the stations to find better time slots for their feature film programming. He even advanced the possibility that features would be broadcast on "prime" time by the networks.

Westrex Wins "Oscar" For Todd-AO Recording Job

Westrex Corp. and Todd-AO Corp. received Academy Award "Oscars" last month for producing and exhibiting the special wide-film, multi-channel sound pictures known as the Todd-AO system. The Westrex contribution to the system included:

Six-track mobile stereophonic recording channels for original production recording involving a completely new recorder and mixer.

Special re-recording console including 96 input circuits arranged for simultaneous 6-track stereo control or separate control of individual tracks.

Special 6-track stereophonic reproducers for use in the re-recording process.

70-mm electrical printer and associated master reproducer for making 70-mm, 6-track magnetic release prints.

Modification of the Westrex Editer to permit cutting and editing 65-mm picture stock.

To make the composite magnetic release prints, Westrex designed and built a special magnetic printer. This consists of a master six-track reproducer, a cabinet containing the necessary electronic controls, and the 70-mm recording printer. The performance specifications on this printer called for a total flutter less than 0.1%, a signal-to-noise ratio of 56 db, and a cross-talk between adjacent tracks of less than -40 db.

For reproduction of the 70-mm composite film in the theatre, Westrex designed and built a ten-track magnetic reproducing head. This head is capable of playing either the six tracks associated with the Todd-AO 70-mm film, or the four tracks associated with standard CinemaScope stereophonic films.

'Bouncing' HF Radio Signals

A new method has been devised to transmit facsimile by "bouncing" high-frequency radio signals from ionized air particles created by the passage of meteors through the upper atmosphere. An experimental system was used to transmit still images nearly 1,000 miles without relays.—RCA Labs.



Type of Benefit	\$45	1 \$100	\$150	\$175	\$200	5225	\$250	\$275	5300	\$325	\$3
Monthly Retirement Benefit											
for one person		1									
Retired at 65 and over	\$30.00	\$ 55.00	\$ 68.50	\$ 73.50	\$ 78.50	\$ 83.50	\$ 88.50	\$ 93.50	\$ 98.50	\$103.50	\$108
Retired at 64 (women)	28.00	51.40	64.00	68.60	73.30	78.00	82.60	87.30	92.00	96.60	101
Retired ot 63 (women)	26.00	47.70	59.40	63.80	68.10	72.40	76.70	81.10	85.40	89.80	94
Retired ot 62 (women)		44.00	54.80	58.80	62.80	66.80	70.80	74.80	78 80	82.80	86
Monthly Retirement Benefit				-			1				1
for a couple (husband			ł								
65 or over)*									:		1
Wife Retired ot 65 and over	\$45.00	\$ 82.50	\$102.80	\$110.30	\$117.80	\$125.30	\$132.80	\$140.30	\$147.80	\$155.30	\$162
Wife Retired ot 64 and over	43.80	80.30	- 100.00	107.30	114.60	121.90	129.20	136.50	143.70	151.00	158
Wife Retired ot 63 and over	42.50	78.00	97.10	104.20	111.30	118.40	125,50	132.50	139.60	146,70	153
Wife Retired at 62 and over	41.30	75.70	94.30	101.20	108.00	114.90	121.80	128.70	135.50	142.40	149
Monthly Disability Benefit											
from age 50	\$30.00	\$ 55.00	\$ 68.50	\$ 73.50	\$ 78.50	\$ 83.50	\$ 88.50	\$ 93.50	\$ 98.50	\$103.50	\$108
Monthly Survivor's Benefit								-	-		
Widow, widower, child or parent	\$30.00	\$ 41,30	\$ 51.40	\$ 55.20	\$ 58.90	\$ 62.70	\$ 66.40	\$ 70.20	\$ 73.90	\$ 77.70	\$ 81
Widow and one child	45.00	82.60	102.80	110.40	117.8C	125.40	132.80	140.40	147.80	155.40	162
Widow and two children	50.20	82.60	120.00	140.10	157.10	167.10	177.20	187.20	197.10	200.00	200
Moximum combined benefit		1		1							1
(oll survivors)	50.20	82.60	120.00	140.10	160.00	180.00	200.00	200.00	200.00	200.00	200
Lump-Sum Death Benefit	\$90.00	\$165.00	\$205.50	\$220.50	\$235.50	\$250.50	\$255.00	\$255.00	\$255.00	\$255.00	\$255

ESTIMATED SOCIAL SECURITY BENEFITS.

Average monthly earnings beginning January 1, 1957

SOCIAL SECURITY LAW:

A Digest of Your Rights and Benefits

THIS is the second and concluding installment of an informative digest prepared by the Research Department of the ILGWU dealing with the rights and benefits provided under the Social Security Law.

(E) MONTHLY DISABILITY BENEFITS AFTER AGE 50

Under certain conditions, starting July 1, 1957, if you are so disabled that you cannot do a substantial amount of work, you may qualify for disability benefits. Disability benefits are paid to:

- 1. Persons who are at least 50 years of age, AND have been disabled for at least six months, AND are expected to continue to be disabled permanently or indefinitely, AND have earnings in at least 20 out of the 40 calendar quarters before they were disabled (at least six of these quarters must have occurred in the preceding three and one-quarter years). Persons disabled after Jan. 1, 1961 will have to show in addition that they had earnings in the same number of calendar quarters as is required for ordinary retirement.
- 2. Persons receiving workmen's compensation as the result of an accident at work, will have their disability benefits reduced by the amount of workmen's compensation until they reach age 65.
- 3. Persons drawing disability benefits may be asked to undergo rehabilitation treatment offered by their state government. If they refuse, disability benefits may be stopped.
- 4. No additional benefits for dependents are paid in the case of workers who receive disability benefits while they are under 65. But starting at age 65, benefits are payable to the dependents of such workers.

5. The amount of the disability benefit is the same as the Old-Age Benefit. For estimates of the amount of disability benefits based on your average monthly earnings. See accompanying table.

(F) "DISABILITY FREEZE"

- 1. Persons disabled before they reach age 50 should apply to the Social Security office for a "disability freeze." In this way, you make certain that the period of time of total and permanent disability is not counted against you to cancel your right to future disability or retirement benefits or to reduce their amounts.
- 2. In order to get a "disability freeze," you must have earnings in the same number of calendar quarters required to get disability insurance. (See Point I under "Disability Benefits.") Application for

"Let the Buyer Beware"

Apologists for pay TV who stress the absence of commercials for that medium got a setback from FCC Chairman John C. Doerfer lately when he told a House investigating committee that advertising may be necessary to finance tollvision. Should this tidy little tragedy come to pass, it would mean that the viewer would be paying for the commercials that he loveth not. (A recent survey showed that only 19 per cent of the viewers looked at commercials.)

This should be no cause for chagrin. If you look at it carefully, the viewer is paying for the commercials that he is seeing right now on free TV.

Still, if we're going to have to pay for the chit-chat and the ditties, the first thing we're going to change is "Winston tastes good as a cigarette should," or else. It's our commercial now. the "freeze" should be made as soon as you have been disabled for six months. DO NOT DELAY. Late application may mean loss of benefit status.

3. EVERY PERSON, OF WHAT-EVER AGE, WHOSE DISABILITY BE-GAN BEFORE JULY 1, 1956. MUST FILE AN APPLICATION FOR A "FREEZE" BEFORE JULY 1, 1957, OR FACE THE LOSS OF THEIR RIGHTS.

(G) BENEFITS TO SURVIVORS OF DECEASED WORKERS

1. The following survivors of a worker who dies, either before or after retirement. may qualify for survivors' benefits:

CHILDREN under age 18, if they were dependent on the deceased worker for support;

CHILDREN of any age who have a total disability which began before age 18 and if they were dependent on the deceased worker for support;

WIDOW, if she is 62 or older, or at any age if she is caring for a child who is receiving a child's benefit;

WIDOWER, if he is 65 or older and was dependent on his deceased wife for support.

DEPENDENT PARENTS of the deceased worker, if they have reached retirement age, BUT only if no other dependents receive benefits. These benefits are paid to survivors only if the deceased worker had a sufficient number of calendar quarters of work to his credit at the time of death.

2. The amount of benefit for survivors is based on the amount of benefit the retired worker was receiving prior to his death. If the worker died before retiring, the amount of benefit is computed in the same way as for a retired worker, considering earnings up to the year of death.

The monthly benefit for widows, dependent widowers or dependent parents is three fourths of the amount to which

^{*} If both husband and wife worked, they may possibly get a higher benefit computed on their separate earnings. Use the figures on retirement benefits for one person to see how much each can get. Each couple has the right to collect the highest amount to which they are entitled.

the deceased worker was entitled. This amount is not reduced for widows and dependent mothers who become survivors before they reach age 65.

The monthly benefit for a surviving child is also three-fourths. If there is more than one child, the total benefit will be larger. For estimates of benefits for dependents on the basis of average monthly earnings of the retired worker, see accompanying table.

3. In no case may the total benefit paid to all the survivors of one deceased worker be more than \$200 a month. In many cases it will be smaller because the total payment ordinarily may not be greater than 80 per cent of the deceased worker's average monthly wages. (If the worker had a very low average monthly wage, a different maximum may apply.)

If total payments to survivors exceeded the maximum amount allowed by law, all payments to individual survivors are proportionately reduced.

4. At death, a lump-sum payment is made to the widow or widower who lived with the deceased insured worker. If there is no eligible widow or widower, the person who paid burial expenses may be repaid up to the amount of the lump sum. The lump sum payment may be as much as three times the insured worker's benefit rate, but in no case more than \$255

OBITUARIES

McArron, Ivor H., 53, member of Local 447, Springfield, Mo., died January 2nd at the Springfield Baptist Hospital following a prolonged illness. A past president of the Local, McArron worked in various Springfield theatres for the past 21 years. He was projectionist at the old Mozark Theatre for 15 years, and later was with the Commonwealth Theatres. He is survived by his parents, a brother and a sister.

BITTENBENDER, T. D., vice-president of Local 224, Washington, D. C., died recently after an illness of several months. Holder of a gold card in the Local, Bittenbender served in various official capacities, and for many years was a delegate to IA Conventions.

Winne, Clare, 54, member of Detroit Local 199, died last month of a heart attack. He was well known along Detroit's Filmrow, having been for some years the owner of several motion picture theatres. He returned to projection work several years ago upon the disposition of his theatre interests.

HOLT, ZOLLIE P., veteran member of Local 288, E. St. Louis, Ill., died April 13 after an illness which confined him to his bed for the past four years. Prior to his illness he worked as projectionist at Miners Theatre in Collinsville. A charter member of the Local, he served for a number of years as

president, vice-president, and husiness representative. He is survived by his wife, three daughters, and three sons.

Young, Ernest, 69, secretary-treasurer of Local 432, Peterboro, Ont., Canada, died last month following an illness of several months. For the past ten years he worked as projectionist at the Odeon Theatre there. A native of Swansea, Wales, he lived in England for a number of years. He came to Georgetown, Ont. in 1924, later moving to Peterboro where he remained until the time of his death.

MITCHELL, MERRITT M., 60, member of Local 253, Rochester, N. Y., died suddenly on April 2. He designed and manufactured the Mitchell reel end alarms that were so

popular with the advent of sound in motion picture theatres. At the time of his death he worked in the projection room of the Regent Theatre in Rochester, Survivors are his wife and a son.

Talk About Progress

An exposure of 10 to 20 minutes in bright sunlight was required to take a Daguerreotype photograph — the first practical photographic process—back in 1839, say General Electric photometric engineers. By the end of 1840, a single year after introduction, the Daguerreotype process had been improved enough to allow photographs to be taken in a few seconds.



INDUSTRY BRIEFS

Every important survey to date has established that the largest segment of a movie theatre audience by far is a youthful one. . . Earnings for 1957: 20th-Fox, \$6,511,218; Paramount, \$5,425,000. About \$4 million of latter sum was profit on sales of films to TV. . . . Formula for business building campaign which kicked off with the "Oscar" broadcast: 1/2 of 1% of each theatre's film rental for 1957. . . . Recent Wall St. Journal, hi-finance paper, ascribes box-office improvement, despite recessio, to "costly pictures, 'hard sell,' free

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FLORMAN & BABB, INC. 68 W. 45th St., N. Y. MU 2-2928 passes, TV ads, love seats, and diaper service."

First two transactions by Music Corp. of America for backlog of 700 pre-1948 Paramount pictures (with WBZ-TV, Boston, for \$2 million, and with KE-TV, Omaha, for \$1 million) indicates a domestic gross of \$70 million for MCA. They paid Par. \$50 million. . . . 20th-Fox sees annual income of \$1,263,000 royalties on oil found on its studio property.

Grim warning that "point of no return" is nearing on supply of theatrical features for TV was given to National Ass'n of Broadcasters at recent convention. Stressed was the fact that TV has now consumed the *initial* exposure value of 8-9000 features, and that only reruns of these will be available in quantity in the future.

For years exhibs yelled to Uncle Sam for divorce of producer-distributor from theatre operations. They finally won it. Now they regret it. Reason: with fewer theatres of their own to service, producers cut output sharply, leaving subsequent-run theatres out on a productshortage limb. And are they yelling anew! . . . Selected drive-ins are now getting "high-key" prints as an aid to screen light level. Just forget that it will also aid in washing out any contrast. . . . RCA's dollar sales for products and services reached billion mark for third straight year, netting a profit after taxes of \$38,549,000. . . . British exhibs won a 50% slash in admission tax. . . . Anything, but anything, for a wisecrack: "Some of them (neighborhood theatres) will have to change into the best-looking bowling alleys anybody has ever seen;" this from our "friend"

Are You Moving?

If so, please notify us one month in advance. The Post Office does not forward magazines. To avoid delay, please cooperate by sending us both your new and old address.

Bob Hope in the mass-circulation Saturday Evening Post.

Over one million "... River Kwai" paper-backs in print; "Peyton Place" over five million... New York City pitching hard for movie production work. This when even Hollywood can't outpitch England, France, Germany, Spain, Italy and Africa... Musicians (AF of L) striking the Hollywood studios but they are the only craft that stays on the outside. All other AF of L units working and loving it—across the picket lines, of course.

Bausch & Lomb Acquisition

Bausch & Lomb Optical Co. has acquired the Applied Research Laboratories, Glendale, Cal., manufacturer of scientific instruments of the optical-electronics type.

ARL attainments in the industrial analytical control field were cited in a B&L statement. ARL employs more than 200. Bausch & Lomb said that "promising new scientific areas, heretofore unexplored by B&L, will serve to round out" the company's line of optical apparatus.

The consolidation would result in improved technical service to their respective customers and would stimulate development of new forms of automatic control instrumentation.



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SMPTE Papers Abstracts

WHILE PRODUCTION techniques involving both film and tape (picture and sound) laboratory procedures and a broad area of television production and presentation dominated the recent 83rd semiannual convention of the Society of Motion Picture and Television Engineers, there were some "straight" motion picture topics which would seem to be of direct interest to readers of IP.

Short resumes of these latter topics are given in the appended summary:

PAY TV—WHY THE CONTROVERSY? by Lloyd Hallamore, Hallamore Electronics, Anaheim, Calif.

Pay TV will have to be a wired system and a telephone utility the organization to install and maintain it. A new approach to Pay TV by completely wired communities is the use of the system for local free TV during the daytime hours with movies shown for a fee in the evening.

The entire movie industry from producers through exhibitors should be supporting Pay TV, not fighting it, hecause it will greatly expand the field for motion pictures, and the exhibitors are the logical operators of the system.

IMAGE ILLUMINATION AND IRRADIANCE WITH CARBON-ARC IMAGE FURNACES, by M. R. Null and W. W. Lozier, National Carbon Co.

Carbon-arc motion picture projection lamps are useful in the production of extremely high flux densities of radiant energy. The application of these to carbon-arc image furnaces has already been described. They are likewise valuable in many studies requiring high concentrations of radiant energy in any portion of the spectrum from the arc.

Comparisons are made of the distribution of irradiance and illuminance across the image with three different types of optical systems. The spectral distribution of irradiance at the center of the image is also given.

A Professional 35-mm Motion Picture Review Room, by R. L. Estes, Eastman Kodak Co.

A professional 35-mm motion-picture review room is one where the variables of screen brightness, light distribution, and color temperature of the screen light are carefully controlled. Dual projection of two pictures side-by-side on the same screen requires arclamps with automatic optical positioning of the carbons, selsyn interlock motors on each projector, and remote focusing controls on the projection lenses.

The methods used to minimize flicker and control ambient illumination are discussed, along with elements of room design, choice of screens, and mechanical equipment. Suggested check lists are offered for evaluating review rooms meeting different standards of performance.

CONFORMAL PRINTING SYSTEM FOR TODD-AO PROJECTION, by Brian O'Brien, American Optical Co.

System compensates in a single printing step for projection keystone, for horizon curvature due to curved screen, and for vertical line curvature due to barrel distortion introduced in very wide angle camera lenses. Resultant projected image appears substantially conformal.

Since projection keystone and horizon curve are constant for all scenes, while barrel distortion changes with camera lens, correction for the latter is programmed automatically from scene to scene together with color and exposure corrections in printer.

MOTION PICTURE LABORATORY PROJECTION FACILITIES FOR SERVICING TV FILM PROGRAMS, by Don Kloepfel, General Film Labs,

Adequate viewing facilities are essential to quality control in a modern film laboratory. Facilities designed for viewing product for motion picture screen use must be increased and supplemented before they can be used to view properly

and inspect film intended for TV presentation. This paper describes such facilities.

IMPROVEMENTS IN THE "BLOWN" ARC FOR PROJECTION, by Russell Ayling and Arthur J. Hatch, Strong Electric Corp.

The air-hlown carbon are has been further refined by the use of a noncoated graphite rod negative which is rotated to reduce carbide deposits to a minimum. Design of components has been simplified to facilitate maintenance and servicing, and controls have been simplified for ease of operation in the theater. The advantages of the infrared transmitting reflector and new 25-inch positive carbon have been consolidated in this development.

PROLONGING THE LIFE OF MOTION PICTURE RELEASE PRINTS, by Eric C. Johnson, Eastman Kodak Co.

Hundreds of release prints are discarded annually because of needless damage to the film. This fact has received renewed emphasis with the increased use of film in TV. This paper outlines proper film handling procedures and techniques starting with the "green" print and the need for film lubrication on through projection, cleaning and inspection.



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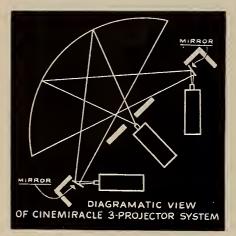
CARBONS INC., BOONTON, N.

STEADIER LIGHT
LESS ATTENTION
PERFECT COLOR BALANCE
Free Carbon Chart

MONTHLY CHAT

(Continued from page 3)

insure rock-steady projection of three joining images. Magazines are positioned side-by-side near the floor, this being a "must" because of possible vibration



Cinemirocle projection process, with beoms from side projectors deflected to reverse side of screen by ongled mirrors.

and of film weight, the 8000 feet of film needed in each reel until intermission break weighing 90 pounds.

Arclamps are Ashcraft Super Cinexs with Micronite arc control. These pull 145 amperes—but herein hangs a tale not heretofore mentioned in any account. Projection people know that any glass surface entails a light loss, thus the two side projectors must and do pull 8-10 amperes more than the center unit in order to offset mirror surface loss. This disparity sometimes gives some weird screen light contrasts between the three panels.

The cost of remodeling a theatre—taking out seats, building a projection room on the orchestra floor or mezzanine. installing a synchronizing system for the three projectors and the separate sevenchannel sound film—is said to be about \$55,000.

In and of itself Cinemiracle is an imposing technical achievement, the screen definition being superb, and it is bound to do better on its next time out. But it still is only a novelty and has no special significance for 99% of movie theatres because of production and exhibition costs and the obvious inability of the average movie house to muster up the necessary wall-to-wall width needed to justify the process.—James J. Finn.

It Seems Everybody Knows

Apropos the remarks appearing in "Monthly Chat" in IP for April, which discussed, among other inanities in this industry, exorbitant executive and "star" salaries predicated on a percentage of the gross, there appeared by mere coin-

cidence, in The Catholic Preview of Entertainment the following:

"If the necessory cooperation among the vorious branches of the industry comes to the surfoce, the tide may turn. . . . If fontastic overhead costs, unnecessary extrovogances and ostronomical stor-and-producer solories are pored down; if the upper echelons of the industry, which hove been biting off the hond that fed them for years, unite in on honest effort to restore the old-time quality of their medium and concentrate on improving their product rother than on figuring how much money they con get in sellouts of old product to TV; if ods stop cheeting and ore designed with on eye to honest merchandising of products: if good musicals and good family pictures are offered to discriminating patrons; if the true wonts of o public looking for escape, cleon romonce, color ond fontosy ore respected, the movies moy yet emerge phoenix-like from the oshes of their self-inflicted foilures ond defeots of the years just gone by."

Written by a "carping outsider"? Not at all, because the editor-publisher of *Preview* happens to be a small-time movie exhibitor in upstate N. Y.

G. E. Color Control Meter

When a piece of metal is heated to about 1400°F, it glows with a dull red color. When heated still more, the glow becomes brighter and more blue rays are given off. As these combine with the red, the metal becomes "white hot," at a temperature of several thousand degrees. Thus, temperature may be used to indicate the color of a source of light.

particularly the relative proportions of blue and red, according to General Electric photometric engineers.

The "color temperature" is usually expressed on the Kelvin scale, which starts at absolute zero (-460°F), the temperature at which an object would have no heat whatsoever. Color temperature of a source of illumination is an important factor in color photography and since late 1954 G.E. has had a product called the Color Control Meter available for such measurement.

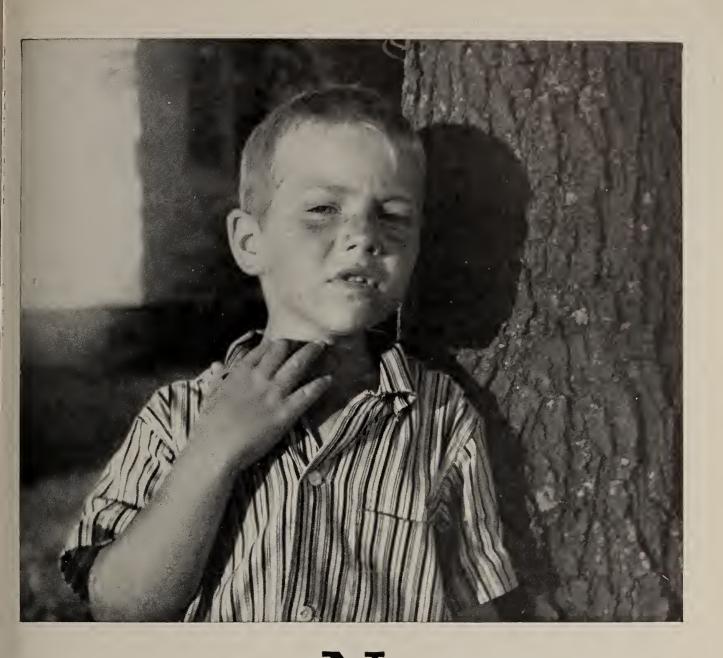
Japanese Mirror Anamorphic

An anamorphic adaptor of a mirrortype has been developed by the Japanese firm, Tokyo Kogaku Co., Ltd. The adaptor, the first of its kind in Japan, has been named "Topcon Colorscope," and will be distributed by Cinematerial of Tokyo.

The adaptor is said to be the same type as the Delrama attachment manufactured in Holland, and the Asiatic makers claim that it will correct distortion caused by steep projection angles. It is attached to the projector port rather than the projector itself.

Details of the mirror anamorphic: anamorphic ratio, 2 to 1; projection distance, 15 meters to infinity; projection angle, 10 to 22 degrees; weight, 315 kilograms; measurements, 267 mm by 253 mm by 140 mm. It is stated that the price of the attachment is about two-thirds that of the usual cylindrical anamorphic lens.

Q: When is a mistake a blunder?
A: When a projectionist is not a regular subscriber to IP—MUST reading for the projectionist craft.
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Monthly Chat

"Automation" is Stultification

Over the years we have heard and read many words emanating from those cost-conscious and presentation quality-unconscious film exhibitors relative to the "automation" of the projection process ("The damned show runs itself")—which observation is invariably coupled with a reference to "safety" (acetate) film having eliminated the "fire hazard," a term which for many years occupied a prominent niche in labor-contract negotiations.

In passing, it might be noted that IP, at no little hazard to its own craft relations, forthrightly urged the craft to extend full cooperation to the introduction of this film base, in the naive belief that not only was it useless to oppose an accomplished fact but that somehow this additional safety factor would enable exhibitors to effect a substantial reduction in insurance rates and thus engender on their part a trifle more appreciation for the technological processes which enabled them to continue in, for them, a very lucrative business

The foundation for this belief, alas, has long since crumbled into dust: instead of heightening the exhibitors' appreciation for things technological, it actually induced a contempt for the process. These are the people who, within the 30-year span of the writer's experience in this industry, have never contributed a nickel to any program for improved technique—in the theatre or out of it.

Now, this "automation" business is strictly malarkey, a piece of pure guff aimed at assuaging the burning desire in the exhibitorial breast to lop off the wage of a projectionist, plus maybe a "swing" man or two, per week. This term "automation" will soon assume the same deadly character in a Union's eyes as that sweet-sounding but equally lethal word "arbitration." (Of the latter, more another time.)

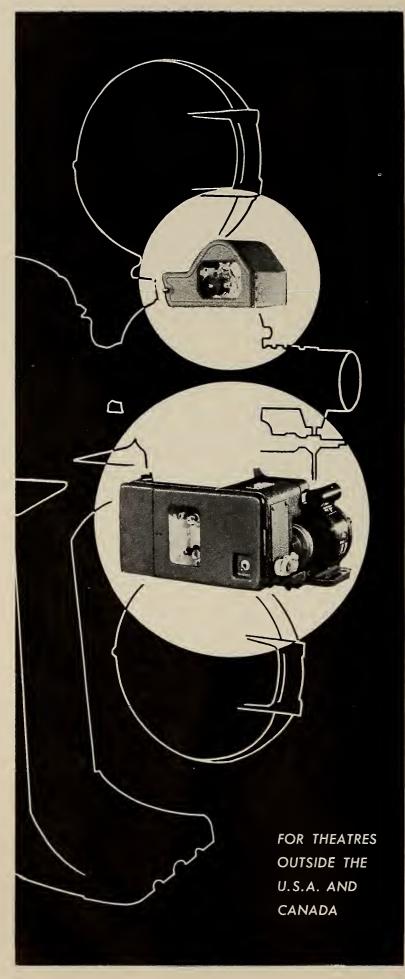
While bleating the other day about the perfidious practice of Paramount Pictures in charging 68 cents per head, plus 13 cents for each child under 12 years of age, at drive-in theatres, the president of Allied States exhibitors, Horace Adams (after drawing a deep breath) caught the outgoing oratorical tide and crested the wave of rhetoric in denouncing the "Unions' surplus manpower requirements." This, of course, was a full-tide reference to "automation," because it's axiomatic that anything automatic runs itself.

Well, on the basis of 1000 admissions, the \$680 paid to Paramount would seem to be ten times the amount Mr. Adams would pay for a second projectionist who properly sells that merchandise, the screen image, which brought him to the Allied presidency. But, understandably, Mr. Adams has no stomach for booking Notre Dame or fighting City Hall, both representative of Paramount Pictures.

We Pose a Leading Question

Mr. Adams evidently requires no slide rule to calculate a projectionist's weekly salary (much less than that of a teamster) but he might with profit to himself and his organization take a few minutes off to calculate where in hell the following technological advances in the past 12 years since the introduction of "safety" film came from:

Three-D pictures, anamorphic lenses, 5-to-1 projector intermittent movements, 35-, 65-, 70- and what-have-you-mm film sizes, a gang of different apertures in any projection room, stereophonic, multiple-speaker sound reproduction, 7-track magnetic film prints, short-focal-length lenses impossible of focus, magoptical prints, bum prints due to penurious distributors, 90-foot screens, no exchange inspection—oh, what the hell. When Mr. Adams comes up with this answer he may feel free to wire us collect.—James J. Finn.





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Volume 33 JUNE 1958 Number 6

Optics of the Motion-Picture Projector

By ROBERT A. MITCHELL

The "intricacies" of the optical system utilized in a motionpicture projector are simplified to an extraordinary degree in the appended article and extra-communicative illustrations.

LL OF the optical intricacies of a motion-picture projector are bound up in two simple systems which are integrated to function as a single unit. One of these systems consists of the picture mechanism with its film aperture and projection lens; the other comprises the carbon arc with its mirror or condensing lens. (Fig. 1).

These two optical systems are very easy to understand. Each involves an illuminated or luminous "object" (the transparent film-photograph in one case, the glowing arc crater in the other) and an image-forming optical element (projection lens and arc mirror).

How is an image formed by an "imageforming optical element"? The pinhole camera provides the simplest example. In place of a lens, the pinhole camera

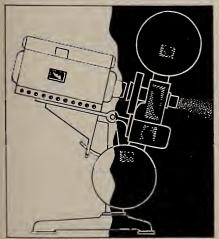


FIGURE 1.

has a very small hole in the front end through which light may pass. The light rays form an *inverted* image of the scene on the film at the rear of the camera because the rays travel in straight lines.

The pinhole, in this case, is the imageforming element. But because sharp images are obtained only with a very tiny hole, the images produced in the pinhole camera are too faint to be of much use. A lens has a vastly greater "light—light-gathering power"; and the larger the lens, the more light it is able to collect to focus into an image, which is also upside-down in the camera.

"Positive" Lens Surfaces

Image-forming lenses, called "positive lenses," are characterized by convex, or bulging, surfaces (Fig. 2). Even if one surface of a positive lens is flat, the other is convex. In the case of a meniscus lens, one surface is concave and the other convex—but the convexity is always greater than the concavity.

When light rays strike a lens—any kind of lens—they are bent toward the thicker part of the glass. A second bending toward the thick part occurs when the light leaves the other surface of the lens. It can thus be understood why a positive lens, having its thickest cross-section in the center, converges light rays to a focus. Negative, or concave, lenses are thickest at their edges, and accordingly cause the light rays to diverge, or spread out.

Figure 3 shows how a positive lens in this case a biconvex magnifying glass —projects the rays from a luminous object to a focus on a distant screen. The rays from all parts of the candle flame shown here fall upon all parts of the lens, but the light-bending power of the lens causes the rays from any one point in the flame to converge to a point on the screen. Each point of the "object" thus has a corresponding point in the "image," which, of course, is necessarily inverted.

The two corresponding points are called "conjugate focal points"; and if

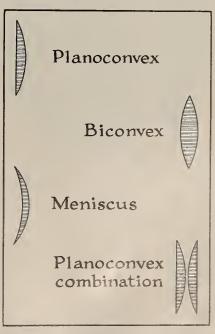


FIGURE 2.

the enlarged projected image is replaced by an illuminated object, a reduced image is formed in the plane of the other conjugate focus. In the first instance we have a projector; in the second, a camera.

If the candle flame in Fig. 3 is replaced by an illuminated film-frame, and the simple magnifying glass by a high-precision projection lens, our simple demonstration setup is at once converted into the optical system of a projector mechanism.

Principle of Refraction

Now, the bending of light rays by a lens is known technically as refraction. The greater the bulging of the lens surfaces, the greater the refraction and the shorter the focal length (E.F. = "equivalent focus") of the lens. The amount

distance from a projector, as in a theatre the use of lenses of long focal length results in small, bright pictures, while lenses of short focal length give larger, but dimmer, pictures. Lenses of the same "optical speed" (F-number) pick up the same amount of light from the aperture, hence the spreading of the available light over a larger screen area by a short-focus lens results in a dimmer picture. The brightness of a picture depends upon the amount of light available and the area of the projected image, not upon the length of the throw!

Simple lenses, such as the magnifying glasses available for a few cents at department stores, can actually be used in theatre projectors as projection lenses, though no one would appreciate the poor results! The screen images projected by a simple lens are very

lens to project a magnified image upon a distant screen, the blurriness caused by spherical aberration would become visible. Because the rate of curvature is constant all over the spherical lens surface, the marginal zones of the lens have a greater refractive power, and hence a shorter focal length, than the central zones! The confusion of focus produced by spherical aberration (shown in the top part of Fig. 5) makes a sharply defined image impossible.

Spherical aberration may be corrected in a simple lens by employing eliptical or parabolic ("aspherical") curvatures of the surfaces. An aspheric lens has less curvature in the marginal zones than in the middle, and thus succeeds in bringing all rays from any point in the object to a single focal point in the image.

The practical difficulties of producing aspherical curvatures have restricted this type of surface to large condensing lenses which are cast in molds, rather than ground from flat blank disks of optical glass.

Corrective Steps in Design

Fortunately, it is possible to correct spherical aberration with spherical lenses when several positive and negative elements, separated by the correct distances, are combined in a lens barrel to form a unit. Such a lens, called a "compound lens" to distinguish it from a single 1-element lens, is shown in the lower part of Fig. 5. Optical designers usually correct not only spherical aberration, but all the other aberrations, when computing a compound lens. One of the first of the other aberrations to be considered is *chromatic aberration*.

A simple lens, even if corrected for spherical aberration by the use of aspherical surfaces, is afflicted by chromatic (color) aberration. If such a lens

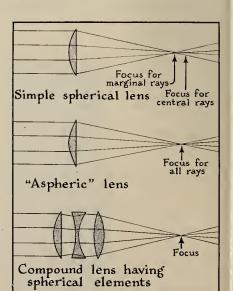


FIGURE 5.

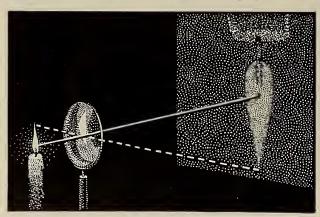


FIGURE 3.

of refraction is also influenced by the kind of glass from which the lens is made, for the flint (lead) glasses have greater "refractive indices" than the crown (soda-potash) glasses. Flint, crown, and other special glasses are used in the manufacture of projection lenses.

When the screen remains at a fixed

Prolate spheroid

Circle

Sphere

FIGURE 4.

blurry because all simple lenses, even if made of high-quality optical glass, suffer from optical defects which are called *aberrations*.

Principal Lens Aberrations

The principal lens aberrations are chromatic aberration and the so-called "von Seidel aberrations" which include spherical aberration, coma, astigmatism, and distortion. All are important, but to simplify our brief excursion into optics, we shall describe only two of them, chromatic and spherical. Let's examine spherical aberration first.

Nearly all commercial lenses have spherical surfaces because it is too difficult to grind and polish aspherical surfaces. Now, a spherical lens surface may be envisioned as a slice cut offcenter from a spherical ball, as shown in the lower part of Fig. 4. It can be demonstrated, however, that a convex lens having spherical curvatures is capable of perfect imaging only when the "object" and the "image" (conjugate foci) are the same distance from the lens. In such a case, the image would have the same size as the object, and be quite useless for motion-picture exhibition.

If the object (e.g., a film transparency) is brought closer to a spherical



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be used in a projector, all the images on the screen will be blurred by colored fringes, notably red and blue. Chromatic aberration is caused by the fact that different wavelengths of light are refracted by different amounts, violet light being bent the most and red light the least.

White light from the sun or a carbon arc is a mixture of all wavelengths from 360 millimicrons (extreme violet) to 770 millimicrons (extreme red). Because the focal length of a simple lens is a trifle shorter for violet light than for red, with all the other colors spread out between them, chromatic aberration produces colored fringes in the image and prevents a sharp focus. (See Fig. 7).

The colors most prominent in the fringes are red, which occupies one end of the spectrum, and blue, which is visually much brighter than the violet at the other end of the spectrum, and hence more readily seen. The brightest wavelengths of orange-scarlet and scarlet-red light lie between 620 and 640 millimicrons, while pure spectrum blue peaks at exactly 465 millimicrons, all C.I.E. "standard-observer" data to the contrary.

Phenomenon of "Dispersion"

Figure 6 is a graphic explanation of the cause and correction of chromatic aberration. Note that a single ray of white light passed through a glass prism is bent toward the thicker part of the prism both when entering the glass and when leaving it. But the shorter violet and blue rays are refracted more than the longer red rays! This property of a prism is utilized in the spectroscope, a device which sorts out the individual wavelengths of light mixtures into an orderly array of rainbow-colors called a spectrum.

The same phenomenon of color separation (called dispersion) occurs when light is refracted by a lens. As shown in Fig. 6. however, the dispersion of a positive lens of crown glass may be counteracted by the opposite dispersion

of a correctly shaped negative lens of flint glass. Color-corrected crown and flint lens combinations are called achromatic (color-free) lenses. Every projection lens contains achromatic lens elements, the individual components of some of them being cemented together with transparent Canada balsam or similar resin.

As Fig. 7 shows, a simple lens has a focus for blue light nearer to the lens than the focus for red light. An achromatic lens composed of two elements corrects this undesirable condition very well, although not perfectly. Under the most exacting conditions, as when the image of a bright star is examined in a refracting telescope having a 2-component achromatic objective lens, two spurious colors may be noticed, yellowgreen and red-purple. This is ordinarily not troublesome, as the yellow-green and reddish purple images lie close together, and the yellow-green image, which includes the brightest spectrum wavelength of 556 millimicrons, is visually many times brighter than the red-purple image.

The purplish image is faint for two reasons. Not only is yellow-green at 556 millimicrons 3.14 times brighter than the complementary red-purple, but the out of-focus purple image is spread out over a greater area.

Anamorphic Attachments

Certain cylindrical-lens anamorphic attachments employed for CinemaScope photography and projection produce a strong horizontal secondary spectrum with annoying greenish yellow and violet fringes in the image.

For a greater degree of color correction, lenses are made with three elements, as shown in Fig. 7. These may be considered perfectly achromatized for all the visible rays, although they may possess chromatic aberration in the infrared and ultraviolet regions, as revealed by photographic emulsions sensitive to these invisible radiations. (As a rule, thick lenses of optical glass, es-

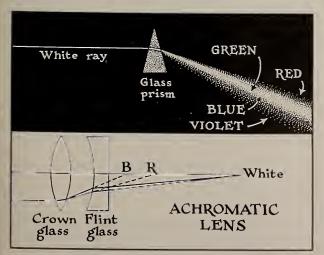


FIGURE 6.

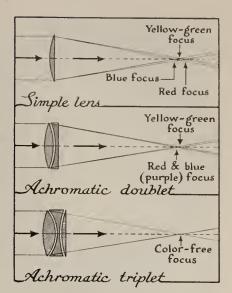


FIGURE 7.

pecially flint, are practically opaque to ultraviolet rays.)

Anamorphic attachments for Cinema-Scope projection exist in several types—cylindrical lens, prismatic, and cylindrical mirror—each of which produces an image enlargement of 2 times in the horizontal dimension and neither en-

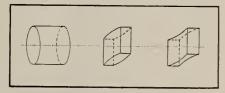


FIGURE 8.

largement nor reduction in the vertical dimension (1 time). For instance, the image magnification produced by the "prime" lens is doubled in the horizontal direction and not affected at all in the vertical.

The design of the usual type of cylindrical-lens projection anamorphot is illustrated in Fig. 8. This attachment functions exactly like a Galilean telescope, or opera glass, except that the lenses are cylindrical instead of spherical to produce magnification only in the borizontal dimension. And like an opera glass, the distance between the two elements, positive and negative, must be adjusted to give a sharp focus at the particular projection throw employed.

Anamorphic in Disfavor

CinemaScope and other anamorphic projection systems have admittedly fallen into disfavor among many technicians who recognize their limitations. Because of the difficulties encountered in the optical design of anamorphic camera lenses, CinemaScope pictures often appear slightly distorted. Both the camera lenses and the projection attachments

(Continued on page 20)

'Focus-Drift'

By JAMES J. FINN

A few pert observations relative to a prime projection problem concerning which there has been too little observation and thought and much too much talk not founded upon the realities.

FOCUS-DRIFT is a prime projection problem today, as reflected by the steadily increasing number of complaints by projectionists anent their inability to achieve proper focus of the screen image. Heat from the arc, radically increased in recent years, is the relentless enemy of good projection, with the lens, the projector parts, and the film base itself being the victims thereof.

Of late, however, projectionists have lent ready acceptance to the notion that the combination of magnetic striping and acetate film base is the chief culprit, and that of the two the acetate base itself is the more blameworthy.

This ready acceptance of a proposition which, while given widespread expression within the craft, is not supported by the facts violates good projection practice in that it precludes serious thought about other aspects of the problem and induces inertia in devising means to solve it.

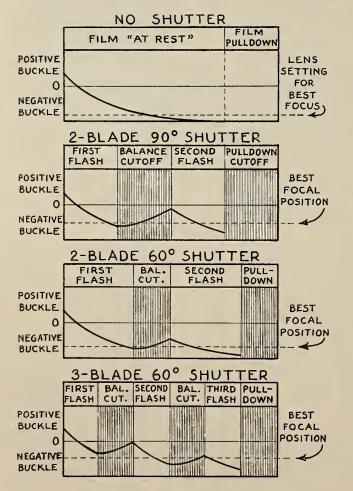
As a noted statesman once said: "Let's have a look at the record [facts]."

'Rigidity' in Film Bases

While acetate film is slightly less rigid than nitrate, the differences are small and, actually, both lose about the same percent in rigidity as the temperature rises. While it is true that acetate film softens when warmed, we must remember that nitrate also softens. When nitrate was used for motion picture film, it was also used for the production of combs, dresser sets, etc.; all of these were formed by warming nitrate and pressing it or blowing it into molds where it behaved exactly like the acetate plastics that are marketed today.

Extensive tests have not indicated that the presence of magnetic striping results in any increased absorption of heat by the film base. First, it is the film trap itself which receives the direct heat of the arclamp and which contacts the larger area of film. This, of course, touches the emulsion side on which there are no stripes.

The film trap door is heated only by conduction through the mechanism and



Illustrotive of the rodical chonges in projector mechonisms and, therefore, projection proctice within the post decode is this grophic example of just one foctor which offects "true" focus (if such be possible)—film behovior in the projector gote.

Film normolly enters
the gote with o slight
"positive buckle" bulging toword the lens.
Emulsion begins to expond relotive to the
film bose the moment
orc rodiation impinges
upon the film, buckling negatively toword
the lomp.

INDOOR THEATRE PROJECTION Summary Indicating Changes During Last Ten Years

LAMPHOUSES	1948	1958
Total Screen		
Lumens,		
Top Houses		/33-46,000
PROJECTOR ME	ECHANISM	1
Shutter		
Transmission	55%	67%
SCREENS		
Average Width		
(For Top 10%		
of Indoor Theatr	res) 25 ft.	55 ft.
LENSES		
Aperture:	F:2.0	F:1.7
Average Focal		
Length		2.05 :
(For Top 10%)) 5 in.	2.25 in.
Depth of Focus (From Tables)	0.010 in	0.0038 in.
(I Ioni Tables)	0.010 III.	0.0000 III.

by some stray light which has already passed through the film. Accordingly, it reaches a lower temperature than the film trap itself. Furthermore, in an unstriped print the tension pads will be in direct contact with the film base; whatever heat is conducted from pads to base will be greater in this instance than if the two were separated by a magnetic stripe.

In other words, the conductivity of the magnetic stripe is many times less than that of steel pads and, therefore, the stripe tends to *reduce* very slightly the heating of the film base.

The only possibility noted for the presence of the stripe to affect focus quality is that the tension pads contact only the surface of stripes 1 and 3 and do not touch the film over the full pad width as they would for unstriped prints. This means that the film is held a little less rigidly if it should be made to buckle toward the projection lens. Since during normal projection, however, the motion is toward the arclamp, this slight difference in holding area has no effect.

The Second 'Villian'—the Lens

There have been noted slight changes in focus from the heating of the projection lens. Rather than changes in the glass curvature, however, much greater importance should be attached to the expansion of the projector frame as its temperature is increased and to the expansion of the lens barrel. These two motions move the lens farther away from the film and also separate the lens elements, both of which must then be

(Continued on page 22)



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This new, totally different type of lamp projects 65,000 lumens for Fox CinemaScope 55 mm (1.340 x 1.06); 56,000 lumens for MGM 65 mm and Todd-AO 70 mm; 55,000 lumens for CinemaScope 35 mm (.912 x .715) and 46,000 lumens for small aperture 35 mm (.825 \times .600), 70% more light than most 18-inch reflector lamps, 51% more light with 35 mm film and an f 1.7 lens.



smaller screens, ask about the

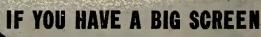
NATIONAL CONSTELLATION "170" ARC LAMP

New "cold" reflector removes approximately 50% of the heat from the beam before reaching the aperture.

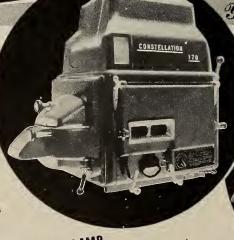
Light booster lens, patterns the spot to the size and shape of the aperture so as to efficiently utilize all useful light.

Lamphouse optical speed is equivalent to f 1.5, and when used with f 1.5/1.6 projection lenses and X-L projectors on

Burns 13.6 mm positive for either 35 mm 35 mm projection. or wide film projection systems.



You Need the Ventarc







NATIONAI

NATIONAL EXCELITE "135" PROJECTION ARC LAMP Outstanding and exclusive features built into both the Constellation "170" and Excellite "135" include: Accommodation of full 20-inch carbon trim. Automatic crater positioning system which maintains the tip of the burning carbon at the exact focal point of the reflector. Single adjustment controls the feeds of both carbons. Simplified

Burns 9, 10, 11 mm Regular and 10 mm Hitex Positives for all 35 mm systems. spot focusing.

NATIONAL THEATRE SUPPLY COMPANY · BRANCHES COAST TO COAST SUBSIDIARY OF GENERAL PRECISION EQUIPMENT CORPORATION the author is one of the major developers of this mechanism.

Gate and Shutter Characteristics

SINCE PUBLICATION of the article, "Modulated Air Blasts for Reducing Film Buckle," (IP, October 1952, p. 14 et seq.), tests and experiments have continued. The behavior of the film in the projector gate, under the critical conditions imposed by large-screen operation, has been further examined.

Today's projection problems are more severe than ever before, because of the continuing trend toward larger screens, greater magnification, and higher arc-light levels. The use of larger screens, whether flat or curved, makes good overall focus a very critical requirement. The increase in picture size, alone, creates demands for better picture steadiness, vertically and horizontally, but even this important factor toward screen image quality, although readily appreciated, is not necessarily the most significant.

Another less obvious factor, with which we are here concerned, is the tendency for the image to move in and out of sharp focus, at a rate too fast for the eye to follow. This results in a general impression of fuzziness which cannot be corrected merely by refocusing the projection lens.

The article referred to above explained how movement of the film along the optical axis produces this effect. Now let us further examine the consequences of film motion in the light of today's projection requirements. The high speed of modern projection lenses, and correspondingly small depth of focus, places particular emphasis on position stability of the film in the gate. The high magnification of short focal length lenses further emphasizes any out-of-focus effect due to film motion in the gate and high arc-light levels provide an environment which favors film motion.

The aforementioned article stated: "Each single picture frame goes through a cycle which starts with pulldown into the aperture, proceeds through the first exposure, the flicker blade cut-off and the second exposure,

By WILLY BORBERG

General Precision Laboratory, Inc.

and ends with the pulldown of the next frame. During the two exposure intervals the film arrests some of the radiant energy from the light source and transforms it into heat. This causes the film to buckle (or bulge) in a manner very similar to that observed in the operation of a bimetallic element. The emulsion being more opaque than the base, absorbs energy, expands, and becomes the outer or convex surface of the bulge. The magnitude of the deformation produced varies continuously during the frame cycle and by an amount which is more than sufficient to affect sharpness of image focus.

"The emulsion side of 35-mm film is toward the light source; and hence the film tends to move toward the light, away from the lens, while it is in the aperture.

"In accordance with the accepted terminology, the deformation is called negative when the emulsion side is convex and, conversely, positive when the emulsion side is concave. Flat film is considered to have zero deformation."

Early Equipment for Studying Film Deformation

Figure 1 shows a typical curve of film displacement at the center of a frame in a two-bladed shutter mechanism. To obtain such a curve, the film position along the optical axis is measured directly in terms of lens displacement, and a dial indicator, calibrated in thousandths of an inch, is affixed to the lens-mount for this purpose. Initial calibration for zero position on the dial indicator is made by focusing the lens to produce a critically sharp image of a conical hole in a flat steel plate, the small end of the hole being in the same plane as the emulsion contacting surfaces of the film trap.

The addition of a viewing shutter and screen scope to the equipment enables observation of successive phases of the cyclicly varying film frame motion. The viewing shutter's drive-motor stator can be rotated so that the shutter opening of about 9 degrees can be phased in relation to the synchronously running projector.

With this stroboscopic arrangement, it is possible to view the screen image in time increments of about one milli-second through all exposure phases of successive frame cycles. The film-emulsion position during any specific phase of the exposure period can thus be established without regard to possible out-of-focus conditions during the remaining unobserved portions of the cycle. Dial indicator readings are then recorded in relation to the phase settings.

Studies made with this equipment led to the use of a modulated air blast, in which jets of pulsed air countered

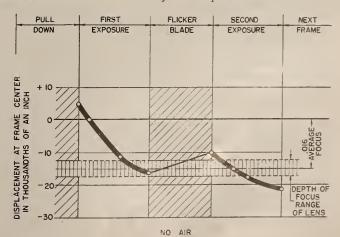


FIG. 1. Film displacement due to buckling at center of frame. No air. Straight gate.

† SMPTE Journal, October, 1957

the tendency toward film deformation.

The pulsed air buckle correction method was tried in a number of installations and showed very promising results. However, several variables, such as film history and its condition, different light levels, and air-line pressure changes made operation unreliable and inconsistent. The air-jet noise also was considered objectionable in some projection rooms.

Improved Equipment

Improved picture quality could be obtained with pulsed air, but the displacement of the perfect focus position from center to side of the frame was too large to allow the full benefit of improved definition over the entire screen.

In these experiments, good focus was sometimes difficult to obtain at

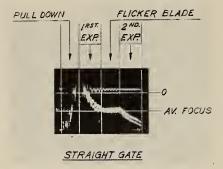


FIG. 2. Oscilloscope trace of buckle move ment. Straight gate.

the early instant of the first exposure. This poor focus condition was not due to travel ghost. There was a possibility that it could be caused by some unexplained prior film action during pull-down, the dark part of the cycle, which could not be observed with the equipment used. The stroboscopic measuring device could, of course, show only film positions while the two open shutter sectors admitted light to the screen.

A different method was therefore worked out to keep "in touch" with the rapidly moving surface of each film frame in the aperture. A mechanoelectrical transducer (RCA Type 5734) was employed in the new equipment,

The transducer is a triode vacuum tube in which the plate is carried by a rigid shaft extending through a flexible diaphragm to the outside of the tube. An extension of this plate shaft, a feeler wire, rests on the film in the center of the aperture. Any movement of the film frame in the direction of the optical axis is thus translated into a displacement between the fixed grid and the movable plate of the triode, with a proportional change in plate current.

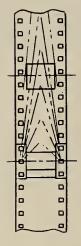


FIG. 3. Probable strain patterns in film at end of pulldown.

An oscilloscope triggered synchronously at the film frame rate, displays a curve very similar to that obtained by the stroboscope method, and in addition, extends into the dark periods, when the shutter blades obscure the screen.

Analysis of Results

A photograph of the buckle movements on an oscilloscope screen is shown in Fig. 2. This is for black-and-white film in a conventional straight projector gate. It shows the first exposure, then the light cut off by the flicker blade which stops the negative excursion, until light strikes the film again with the second exposure. The upper horizontal line, just above the zero line, indicates the running film plane position without light, that is, with lamphouse dowser closed.

At the left of the photograph, in the section marked "Pull Down," note the steep return toward the zero position as the new, fresh frame enters the gate. The new film frame is not at rest, however, even though no light has yet hit it, and no energy has been absorbed.

It appears as if a fluttering motion violently shakes the new film frame beyond both sides of the zero position, and this movement reaches into the beginning of the first exposure. This same phenomenon was observed by Carver, Talbot and Loomis of Eastman Kodak Co. in some sections of the high-speed film on film buckling made at their laboratory and shown to the Society in 1943.

It is believed that a strain pattern exists in the length of film in the pro-

jector gate, down to the intermittent sprocket. In Fig. 3, we have tried to illustrate the pattern set up by the forces of pulldown, holdback friction and film inertia between perforation edges.

Curved Gate

The above discussed defects in the projection phase, which are responsible for a serious amount of degradation in the overall system of motion pictures, led to an investigation of the curved film gate as a means of stiffen-

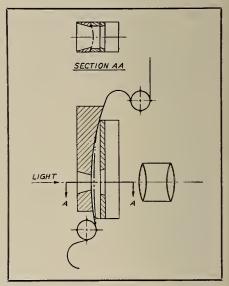


FIG. 4. Attitude of film in curved gate.

ing the film and of restraining these undesirable film frame motions.

Fig. 4 shows the attitude of the curved film with respect to the projection lens. It conforms with the curvature of field of the projection lens. The upper drawing, Section AA, shows the film (broken line) as it enters the curved gate at the aperture, at the beginning of the first exposure. Note that it is curled toward the lens, that is, positive.

[TO BE CONCLUDED]

Novel 'Solion' Integrator

Replacement for radio tubes and transistors which could cut weight, size, cost of airlines' navigation equipment, may be a new electrochemical device, the solion, says Navy's Ordnance Laboratory. One type, a 20½ x ½ inch integrator unit, is small cylinder divided by a porous ceramic filter with electrodes immersed in iodine-containing potassium iodide soln. Low current starts integrator; changes in temperature, pressure, light, sound, acceleration caused by airplane movements keep unit producing current.

Index of Refraction

A lucid explanation of one of the basic laws governing the computation, manufacture and use of optical glass. By the Scientific Bureau of Bausch & Lomb Optical Company.

NQUISITIVE minds have been interested in the refraction of light since the first century. Ptolemy, in the middle of the second century, made observations regarding the angles of incidence and refraction for light passing from air into glass. At the end of the tenth century, Alhazen realized that these angles were associated by some definite relation.

It remained for William Snell, in the 17th century, to discover this relation and state his law of refraction:

"When light passes from one medium to another, the sines of the angles of incidence and refraction bear a constant relation to each other, which equals the ratio between the refractive indices of the two media."

Standard Medium is Air

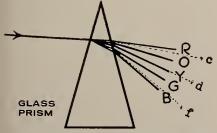
Light travels through any medium with a definite velocity characteristic of that medium. It follows that the ratio between the velocities of light in any two media will always be a constant quantity. The need for a standard medium with which all others may be compared is apparent, and, as one might expect, air or free space has been established as this standard, and taken as unity.

The ratio of the velocity of light in air to the velocity of light in a medium is known as the Refractive Index of the medium, usually denoted by the letter "n."

velocity of light in medium

As light travels with a greater velocity in air than in any other medium, the refractive index of any other medium will be greater than unity.

While all wavelengths of light travel through air with the same velocity, in



Different wavelengths travel at different speeds through glass, producing different refractive indices.

other media different wavelengths of light travel with different velocities—the longer wavelengths traveling with greater speed than the shorter. Therefore, as refractive index is dependent upon the velocity of light, we shall see that such a medium as glass must have one refractive index for each wavelength of light.

Dissimilarity in Index

Red is a longer wavelength and will travel faster through glass than blue light; the refractive index of glass is less for red light than for blue light.

It is this dissimilarity in refractive index that causes white light to be dispersed into its component colors by a prism and produces the color fringes primarily noticeable in prismatic spectacle lenses or in bifocals made from flint glass. Single-vision lenses made from crown glass do not cause troublesome color fringes.

The solar spectrum contains three spectral lines, or colors, having wavelengths important in the measurement of refractive index. These are known as the Sodium D line, located in the central portion of the visible portion of the spectrum, the Hydrogen C line in the red, and the Hydrogen F line in the blue (Fig. 2). In referring to refractive index without further qualification, one has in mind the mean refractive index or the index for the Sodium D line, n

In any type of glass, a relationship exists between the three refractive indices for the above spectral lines. This relationship is known as the relative dispersion of the glass, a measure of the degree to which the glass will separate

What Are Your Answers?

Here are three questions relative to projection optics—the answers to which are readily available to the prying eye of any reader of this issue.

- 1. What is spherical aberration—with particular reference to "marginal areas"?
- 2. What is charomatic aberration—remember here we are dealing with wavelengths of light?
- 3. What is "coma" as applied to a lens?

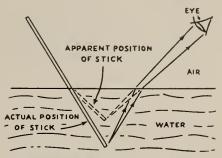
How keen is your perception?

white light into its component colors. Because this quantity is always fractional, its reciprocal is invariably used, and is referred to as the Nu (often called V) value.

$$N_{II} = \frac{n - 1}{n - n}$$

$$F = 0$$

One must bear in mind that Nu represents the reciprocal of the dispersive power. A high Nu value represents a



The displaced image of a stick in water is the most familiar illustration of light refraction.

low dispersive power, and a low Nu value a high dispersive power. In the many types of glass made by Bausch & Lomb, the Nu values vary from approximately 67 to 21. Generally speaking, glasses having a Nu value greater than 50 have a low dispersive power.

Snell's Law of Refraction

To measure the refractive index of a glass it is not necessary first to determine the velocity of light in the air and in the glass. By utilizing Snell's law of refraction we have a more practical procedure. For light going from air to glass Snell's law states:

As the refractive index of air is unity, then if we let n denote the refractive index of the glass, we have:

$$\frac{\text{sine i}}{---} = n$$

$$\text{sine r}$$

By preparing a glass sample and using a suitable instrument we may determine the refractive index by measuring the angles of incidence and refraction and computing the index by means of the above formula.

Nu value and refractive index are both of great importance in the science of optics. Index is so critical in the quality of ophthalmic glass that it must be measured to the *fifth decimal place*. Without such accurate knowledge and control, precision lens grinding and accurate measurement of curvature would be of no avail.

In The

SPOTLIGHT

The function of this department is to provide a forum for the exchange of news and views relative to individual and group activities by members of the organized projectionist craft and its affiliates. Contributions relative to technical and social phases of craft activity are invited.

NO LESS important to the millions of wage-earners in America than the "right to work" guff so dear to the hearts of California politicians is the right to have recognition in the form of old-age security after having worked the major portion of one's lifetime, usually for one corporate entity, and having contributed what Abraham Lincoln termed the "most important" effort as between capital (investment) and labor (production).

The foregoing serves to bridge the gap between this department and the publication elsewhere herein of a detailed exposition (under "Good and Welfare—Old-Age Benefits: Apply to You?) of that which accrues to an elderly worker as a matter of law.

When the idea of Social Security legislation was first proposed during F.D.R.'s tenure as President of these United States, the relatively mild term "socialism" was quickly translated into the opprobrium "communist". In the intervening years much has transpired, including several million dead and wounded fighters for freedom of the individual (no flag-waving, this, but fact), to prove conclusively the Lincolnian estimate.

Reference to the point we are trying to make is the appended excerpt from the statement made in this department in IP for February last apropos President Walter Reuther's bid for profitsharing by his automobile workers in corporate profits:

"All Mr. R need do to win his little tiff going away is to point to the Eastman Kodak profit-sharing plan which has entailed the disbursement of hundreds of millions of dollars to its employees over the years and with inestimable benefit to Kodak. This company likes the idea.

"Latest Kodak profit-sharing divvy for 1957-58: more than \$38,200,000 among 50,000 employees."

This is in our book security with a

capital "S" and is our method of directing specific and extremely close attention to the old-age and disability provisions of the S. S. article previously mentioned.

• A contract negotiated in 1956 by New York City Local 306 provided that a welfare payment of 7% of the *individual* member's weekly wage be paid into a benefit fund by the exhibitors. The usual trusteeship setup was agreed upon: 3 members appointed by the Local and 3 others named by the exhibitors.

The contract, as related to wages and working conditions, included the now-customary arbitration clause—that is, one man named by the Union and one other named by the exhibitors who, between themselves, would agree upon a third and, ostensibly, impartial arbiter.

But the contract did not specifically mention that the welfare fund payment clause was arbitrable. RESULT: After paying the 7% into the fund for two years and then being confronted with an automatic tilt of an additional 3% (total of 10%) in payments after two years (called for in the contract), the



Rexford Elder (second from right), president of San Francisco Local 162, congratulates Anthony L. Noreiga, former official, on being named president emeritus of the Local. Also shown are Henry Meyer, business representative (extreme left), and Philip C. Tudor, secretary-treasurer (extreme right).

exhibitors balked—or, to put it bluntly, "stalled." The exhibs, including the splendiferous Radio City Music Hall which grosses approximately \$150,000 a week, said that any disagreement was arbitrable, including their contractual agreement to up the welfare payment by 3% after two years.

The exhibs sued for judicial sanction of their "viewpoint." They lost in their first legal foray. This department has been advised that Local 306 will now press for a final judicial judgment and, if successful, will impose a 6% interest levy on the *unpaid* back welfare payments.

MORAL: Provisions for arbitration in any contract should specifically exclude welfare payments.

- Canadians not being exactly ubiquitous (they leaning more to the dour side and always on the alert for "typographical errors" in IP) we were pleasantly surprised by a visit from our old (and, reluctantly stated, good) friend H. N. "Doc" Elliott of L. U. 173, Toronto, erstwhile gentleman chicken farmer. Aside to George Jones: Is "Doc" stating fact about the replacement of that numismatic piece?
- Unfair labor practice cases continue to flow into the N.L.R.B. at steadily increasing record rates, reflecting the depressed economy. In the first three months of 1958, for the second consecutive quarter, the number of such cases filed established a new all-time record. Cases against both employers and unions again reached new highs.

During this quarter, 2,760 unfair practice cases were filed. This was an increase of 97% over 1,401 such cases filed in the corresponding quarter of 1957, and an increase of 32% over the 2,095 such cases in the last quarter of 1957. Also, it was an increase of 56% over the highest level reached before the present spectacular upsurge began in the fall of 1957. In the last three months of 1957, filings of unfair practices spurted up 73% over the corresponding quarter of 1956.

• Cleveland Local 160 recently observed its 50th anniversary at a banquet held at the Hollendon Hotel in that city. Attended by more than 400 persons, including top IA officials and many leading industry and civic figures, the celebration was a gala affair.

A highlight of the festivities was the presentation by IA President Richard F. Walsh of an engraved gold watch to each of the eight remaining charter members of the Local: Ross Thompson, Bert Brock, Victor Johnson, Max Rosenfeld, Roy Wood, Jake Fried, Abe Copperman, and Joe Lukachie.

Perry Carter, business representative

Under Good and Welfare

Old-Age Benefits: Apply to You?

[See Lead Item in "In the Spotlight" Section]

N 1957 Congress amended the Social Security law to give an extension of time for disabled people to file their applications. If a disabled worker does not apply for his social security disability rights before July 1, 1958, he may lose his disability protection and also his rights to any old-age or survivors insurance benefits in the future.

Severely disabled people who, because of their condition, are unable to work, can protect their future benefit rights; and those who are 50 or over may receive monthly disability benefits. Disabled children of retired workers and of workers who have died can apply for social security benefits, even if they are 18 years of age or older, if they have been disabled since before their 18th birthdays and were chiefly dependent on the worker.

In order to qualify for disability insurance payments at age 50, you must

have social security credits for 5 years of work in the 10 years before the established beginning date of your disability and $1\frac{1}{2}$ years of work in the 3 years before that date.

Disability Must be Proved

You don't have to be completely helpless to be found "disabled" under the social security law, but you must have a disability which, in the words of the law, makes you unable "to engage in substantial gainful activity." You must have the kind of physical or mental condition which will show up in a medical examination or tests.

Paternalism? No-this is the law.

Your condition must have lasted for at least 6 months and must be expected to continue for a long and indefinite time. If it be a temporary disability and can be expected to improve with further medical treatment to the point that you

"Motion Picture Operator" to "Motion Picture Projectionist."

Batavia Local 581 won praise as a host. Sec.-Treas. Charles Wheeler notes that the Association is now "in the black," and that the Fall meeting will be held in Jamestown, N. Y.

• Motion picure production employes who are compensated at a base rate of at least \$200 a week, automatically are classified as executive, administration or professional employes for the purposes of the Taft-Hartley Act, the Dept. of Labor explained by way of excluding this group from those affected by amended wage-hour regulations effective May 1.

The announced changes fix new salary criteria for these job classifications; to be considered an executive one must be paid at least \$80 a week, under the new rules, while administrative and professional workers must be paid a minimum of \$95 weekly. A special provision, governing motion picture producing industry employes, adopted in 1950, is carried into the amended act. It makes the base pay of at least \$200 a week, the sole criterion.

Persons in the three named classifications are not entitled to premium pay for hours worked after 40 hours a week, nor are they counted in NLRB collective bargaining elections and, consequently, their functions are not subject to union bargaining demands.

will be able to work, you cannot qualify under these disability provisions.

In deciding whether your disability keeps you from working, a team of trained people—doctors and others who have had experience in seeing the effects of disabling conditions upon people's ability to work—will consider all of the facts in your case.

The medical evidence will show the severity of your condition—to what degree you are unable to do such things as moving about, handling things, hearing, speaking, understanding or reasoning. This medical evidence, taken together with the other information about you—the kinds of work you have done in the past, your education, your training, and your other abilities—will show whether your condition keeps you from doing any substantial gainful work.

If you are between 50 and 65 years of age, and if you meet the work and disability requirements explained previously, you may be entitled to monthly disability payments. The amount of the payment depends on your average earnings; it is the same as the amount of the old-age insurance benefit for which you would be eligible if you were 65.

Present Payment Status

The amount of any social security benefit based on disability is reduced by the amount of any State or Federal workmen's compensation payment you receive, and by the amount of any other Federal payments you receive because of disability, except compensation received from the Veterans Administration for a service-connected disability.

If you are disabled and under age 50, you are not eligible for disability payments, but you may be eligible upon application to have your social security earnings record "frozen". Unless your earnings record is frozen, the period during which you are disabled and have little or no earnings can reduce the amount of your own and your family's future payments. It may also prevent you from receiving the disability payments when you reach age 50. To be entitled to a disability freeze, you must meet the work and disability requirements aforementioned in the explanation of disability payments.

Remember, if you are disabled and your disability began before 1957, you will have the full protection of the law only if you file an application before June 30, 1958.

Further detailed information is available from your nearest Social Security office (U.S. Govt. listing) or from IP.

BUY U. S. SAVINGS BONDS

for the Local, made the opening address at the banquet. Incidentally, the unusual cover of the souvenir program, designed by Carter, carried a duplicate of the Local's original charter which was granted December 4, 1908, and the names of the charter members.

Among the IA officials present at the event were President Walsh; Harland Holmden, general secretary-treasurer; Walter F. Diehl, assistant to Pres. Walsh; LeRoy Upton, 8th IA vice-president, and John A. Shuff, 7th IA vice-president.

• Sixteen IA Locals were represented at the meeting of the N. Y. State Association of Motion Picture Projectionists on May 19 at Batavia, N. Y. The first session was opened at 3 p.m. by President George Raaflaub, and after a break for a buffet supper an evening session was held. Then followed a midnight banquet.

Certain matters relating to drive-in theatre operations and a review of the new State Compensation Law highlighted the discussions. The latter topic was handled by Nat Doragoff, a Referee of the N. Y. State Compensation Board and past president of the 25-30 Club. Other speakers were Ed Lachman of Lorraine Carbons, who answered questions anent his product and also discussed European projection practices, and President Raaflaub, who suggested a change in the IA Charter term from

AUDIO · VISUAL

EDUCATIONAL . INDUSTRIAL . COMMERCIAL

Optimum Conditions for Viewing by Projection

By H. HARTRIDGE*

Reflecting a tremendous amount of effort on both the research and practical application fronts, the appended data are excerpts from a most perceptive and comprehensive treatise by one of Britain's outstanding and versatile scientists, as attested by the accompanying footnote. These data, while pointed directly at the non-theatrical field, range so far and inclusively over the entire projection process, as to be of inestimable value to all workers, including the professional group, in the art.

This contribution was published in its entirety in the April, 1958 issue of *The Photographic Journal* (official organ of The Royal Photographic Society before which it was originally presented orally) and it is available in the complete *Journal* at 4s. (approx. \$.56) or in reprint form at 2s.6d. (approx. \$0.35), both postpaid. Address the Society at 16 Princes Gate, London, S. W. 7, England.

THAT there must be (for the best projection of color slides) adequate illumination, definition and screen size is obvious, but there are many other factors which contribute to efficiency. For good perspective the picture projected on the screen should be an exact replica, in two dimensions, of the three-dimensional scene originally photographed.

But it is usual to find marked differences between the two. The light falling on the screen is seldom the same as that which illuminated the scene. Screen definition is less sharp, and screen colors usually lack the saturation of those of nature.

The causes of these differences are many. Some may be placed under physical headings such as diffraction, lens aberrations, vignetting, and distortion. Others are physiological in origin, such as glare or the reduction of color appreciation caused by a fall of light intensity.

Presentation Requisites

It is not suggested that the screen picture should have all the attributes of the original scene. Such an achievement would be impossible. What is suggested is that there should be such fineness of definition, such fidelity of color reproduction, and such precision of focusing that the screen picture will stand up to the scrutiny of the observer with good sight without breaking down.

Herein the camera, the projector, and the lens system of the human eye will be considered to be forming, in conjunction with one another, a single optical instrument in which the color film and the screen act as temporary carriers of the image, performing a similar function to the field lenses in such an instrument as a telescope.

FACTORS WHICH AFFECT SCREEN Size and Angle of View

DEFINITION OF TERMS. "Angle of view": the angle in degrees which a particular object, usually the screen, subtends at a given observer's eye. "Viewing distance," or "screen distance": the distance between the center of the screen and the observer's eye. "Viewing ratio," or "aspect ratio": the ratio between the screen width (or height, since the screen for the projection of transparencies is usually square) and the screen (or viewing) distance. It will be noticed that this ratio is directly connected with the angle of view, since they increase and decrease together as the viewing distance (in respect of a particular screen) is altered.

There are four factors which are principally concerned with the screen: visual acuity, color appreciation, correct perspective, and the size of the screen grain.

According to the visual acuity of the observer, there is an optimum viewing (or aspect) ratio, any marked departure from which will be attended by inferior results. For color appreciation to be at its best, the larger the viewing (or aspect) ratio the better. For correct perspective, the viewing (or aspect) ratio should have a particular value which depends on the focal length of the camera lens with which the transparency was taken. Finally, according to the dimensions of the grain of the screen, the screen itself should have dimensions which are not less than a certain size.

It will be shown later that it is possible to satisfy these four conditions at one and the same time.

LIGHT INTENSITY VS. VISUAL ACUITY

In ophthalmic practice, it is the usual procedure to measure visual acuity by means of accurately printed letters which are viewed at a fixed distance, usually 6 metres. At the top of the chart, the letters are large, but they get progressively smaller as one passes down the chart towards the bottom. Each line of letters has a fraction assigned to it: 6:36, 6:24, 6:18, 6:12, 6:9, 6:6, 6:5, 6:4, and rarely 6:3.

What do these fractions stand for? If a man can read the top line, and no more, 6:36 is placed against his acuity, meaning that so poor is his vision that he is able to read at a distance of 6 metres† (approx. 19 2/3 feet) a line of type which a person with average acuity would be able to read at 36 metres (approx. 118 feet). Average acuity is designated 6:6. Thus 6:5 indicates acuity somewhat better than the average; 6:4 very good acuity indeed, and 6:3 exceptionally good acuity.

Two conditions which have an adverse effect on good visual acuity are poor lighting and glare. With regard to the first, various standards of illumination have been recommended for different types of building and for different kinds of employment. Several standards of screen brightness have been proposed, both for motion pictures and still transparencies.

Brilliance and Screen Size

Glare can arise in several ways. It may adversely affect either the picture when it is projected onto the screen, or the screen picture when it is received on the retina.

Visual acuity remains comparatively stable in the presence of wide variations

^{*} Moster of Arts, Doctor of Medicine, Doctor of Science, and Fellow of The Royal Photographic Society; also, Emeritus Professor of Physiology, University of London, and Greshom Professor of Physics, Gresham College, London.

[†] a metre == 3.281 feet.

of light intensity. A thousand times increase in the latter has the effect of causing less than twice the acuity! Moreover, if the higher intensity exceeds about 100 foot-lamberts, the acuity may not show so large an increase as this. Under adverse conditions, there may even be a fall, specially harmful is glare (discussed in subsequent installments). Of course, it is essential that there should be precise focusing of the eye.

A point of practical importance relates to which is the better way to increase the perception of fine detail in a projected transparency—whether to increase (a) screen brightness or (b) screen size?

Now, a tenfold increase in brightness improves detail perception 128%; whereas a twofold increase in screen area (which causes screen brightness to be halved) increases detail perception 135%. It is concluded that a large screen is more efficient than a bright one. But, as will be seen later, there is a limit to the size of screen which can be usefully employed.

Visual acuity is only one factor of importance; others are color perception, perspective, and the graininess of the screen. In addition, there are many practical questions such as the size of the room, the height of the ceiling, and the number of people in the audience. All these factors will be referred to in subsequent installments.

[TO BE CONTINUED]

Automatic Threading for B. & H. 8-mm Projector

AN AUTOMATIC threading 8-mm movie projector, the first of its kind, has been announced by Bell & Howell Co. The projector, known as the Auto Load, whisks the film through the threading mechanism in less than 3 seconds.

The film is inserted in the threading channel of the new projector. The automatic threading mechanism forms the film loops, engages the sprocket teeth and directs the film through the channel of the aperture and pressure plates, all the while handling it gently by the edges.

Another "first" in 8-mm movie projection is the ability to restore a lost film loop without stopping the projector. When the loop is lost due to torn film perforations or warped film, the picture on the screen jumps with an effect similar to roll-over on a television set. In conventional projectors the film must be rethreaded, but with the Auto Load a touch of the finger to the film guide restores the loop and a steady picture without interrupting projection.

A new lens-focusing knob that is easy to grasp and turn helps secure a sharp focus in a hurry, so that even the first few teet of film can be seen clearly. For film with a ragged or broken end, there's a film cutter on the projector that snips it off evenly before its trip through the automatic threading mechanism.

A-V Projector Lease Plan

Sound motion picture projectors for 16-mm product may now be leased by the month, or even for a lesser period, under a new plan announced by Technical Service, Inc., of Livonia, Mich. The company manufactures equipment and provides a variety of services in the audio-visual field.

Leasing is available on three portable models, offering combined large screen and built-in screen projection, and repetitive projection on a built-in screen. Renters can convert from leasing to purchase, with allowance for fees paid. Service charges for installation, maintenance and projector training are on a "pay for what you get" basis.

Widespread Use Encouraged

The rental-leasing plan is designed to encourage wider use of 16-mm sound pictures for training, education and demonstration by eliminating projector cost as a major consideration. In the

new leasing plan, the rental is only a fraction of the purchase price.

As an example the company's Model M6 Moveiematic projector, a built-in screen unit rents for \$84 for one month, with the rental dropping to \$45 at the sixth month. Rental periods shorter than a month can be arranged. Technical Service, Inc., manufactures projectors for point-of-sale and desk-top demonstrations, conventions, classroom and auditorium instruction and training.

Multi-Purpose School Unit

DUKANE CORP., of St. Charles, Ill., has a new electronic communication. signaling, safety and teaching system for schools. Called the MCS, multipurpose communications and signaling system, it utilizes an electronic network which is said to combine into one system the functions of a public address system, emergency alarms, fire sensing and detection equipment, telephone-intercoms, clocks and class-break signals, and closed-circuit TV.

The basic plan of the MCS can be incorporated into a new school at low cost, often for the same cost as the installation of an ordinary sound and clock system, according to DuKane.

Sylvania Develops New 8-mm Projection Lamp

A new type of electric lamp for 8-mm projectors has been developed by Sylvania Electric Products, Inc. It is no larger than a standard flashlight battery, measuring 3% inches—smaller than any comparable projection lamp. Named the "Tru-Flector," this type lamp will not only be used in 8-mm projectors, but study is being made for larger applications in 16 and 35-mm. There are potential uses for the new device in

DIFFICAL SYSTEM OF STANDARD MOVIE PROJECTOR
USING CONVENTIONAL PROJECTION LAMP

LAMP FILM GATE OBJECTION LAMP

OFFICAL SYSTEM OF STANDARD MOVIE PROJECTOR
USING CONVENTIONAL PROJECTION LAMP

Comparison of new Tru-Flector optical system with present-day condenser system.

automatic controls, infrared heating, and microscopy illumination.

The lamp is expected to permit development of small, streamlined, lightweight projectors that will maintain substantial light output. Sylvania states that the Tru-Flector breaks through the so-called "wattage barrier" which makes light output dependent upon the number of watts packed into a lamp.

Matches 500-Watt Output

Claim for the 150-watt lamp is that it can provide about the same screen brightness as the larger 500-watt types in present use, through the positioning of a small silvered metal mirror within the lamp, thus eliminating external reflectors and condensing lenses which are standard equipment today. Also, projector blower size and noise may be reduced because of lessened cooling requirements.

The 115-volt Tru-Flector utilizes a 150-watt horizontal coiled lamp filament precisely positioned in relation to the metal mirror. The mirror is mounted on the same base that was introduced with Sylvania's Tru-Focus two years ago.

In development for five years and now in production, the lamp has a T12 soft glass bulb, and a rated average life of 15 hours. Its burning position is base down. Lumen rating is given as 95.

OPTICS OF THE MOTION-PICTURE PROJECTOR

(Continued from page 9)

may be responsible for blurriness toward the sides of the screen. Fadeaway is increased, and anamorphic projection attachments of all types waste all of the extra light transmitted by the slightly larger CinemaScope aperture.

The screen-lumen data provided by lamp manufacturers for CinemaScope projection were obtained from light measurements made without anamorphic attachments on the projector, and should be ignored by the sophisticated projectionist.

Both large-negative systems of photography and improved methods of conventional 35-mm photography and film-printing have proved conclusively that the use of anamorphic optics is an unnecessary complication in the commercial movie industry.

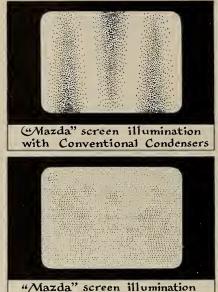
A projection lens can work efficiently only if the transparency—the tiny film photograph over the aperture—is illuminated in such a way as to provide the lens, as well as the transparency itself, with maximum light. Rays of light which are not intercepted by the projection lens are utterly wasted, so far as image brightness is concerned, even though they pass through the aperture and film!

"Specular" vs. "Diffuse" Light

In addition to using a large-diameter ("fast") lens, therefore, the light from the projection lamp should pass through the aperture in a beam of nearly parallel rays, as shown in the left-hand part of Fig. 9, insead of scattering in all directions, as shown in the right-hand part of the diagram. Fortunately, projection lamps of all types—mazda, carbon arc, and xenon discharge bulb—furnish what is called "specular" illumination.

"Diffuse" illumination occurs only in opaque projectors, which reflect light from postcards, maps, etc., and in conventional television projectors. Large reflectors are used instead of lenses in TV projectors to pick up the maximum amount of light from the diffusely radiating picture tube, but Schmidt correcting correcting-plates are necessary to counteract the aberrations of the large reflectors.

Diffuse illumination may be demon-



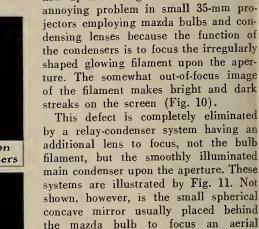
with Relay Condensers FIGURE 10.

strated by placing a frosted mazda bulb behind a projector aperture plate. The light spreads out in all directions as it emerges from the aperture; and even the largest lens fails to intercept all of it. Such a system is not only inefficient, but reduces the contrast of the projected pictures to give "softer" images.

The densities of silver images are about 30% higher when specular illumination is provided by regular projection lamps. (The lower densities produced by diffuse illumination are believed to be due to internal reflections of light from the silver grains embedded in the photographic emulsion.) Specular illumination nevertheless makes scratches in the film base more prominent by their effect upon the direction of the light rays.

[This effect, more troublesome with older "slow" and excessively specular lamps than with modern lamps of high optical speed, has recently been called to the attention of IP by Projectionist Thomas W. Rich of Corpus Christi, Texas.]

Not only should a projection lamp possess a high illumination efficiency, it should also provide a uniform distribu-



of the projected pictures.
[One arclamp, the new high-powered Strong Jetarc, is able to use a similar "backing" mirror because of the unusual shape of the glowing arc.]

image of the filament between the wires

of the actual tungsten filament, thus

substantially increasing the brightness

tion of light over the entire area of the

film aperture. Light distribution is an

Reflector Lamp Advantages

Carbon-arc lamps may employ either condensing lenses between the arc and the film aperture, or a mirror behind the arc, at the rear of the lamphouse. The mirror arc is favored today. The function of either condenser or mirror

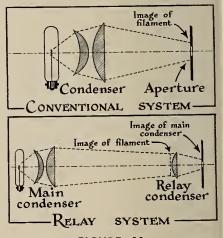
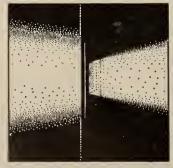


FIGURE 11.

is to collect as much light as possible from the white-hot positive crater and concentrate it upon the picture aperture by forming thereon an image of the crater—the circular "spot."

A few old-style lamps employed a parabolic mirror to collect the light and a large condenser to converge the parallel reflected rays to a focus upon the aperture. This and the regular condenser and reflector lamp optics are diagrammed in Fig. 12.

Although the first projection arclamps were of the condenser type, the reflector lamp has the advantage of greater optical speed and freedom from the aberra-



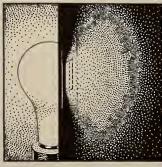


FIGURE 9.

tions which afflict condensing lenses. The better condensers are aspheric lenses; but whereas these are free from spherical aberration, chromatic aberration remains. Elliptical reflectors, "faster" and less expensive, are free from both defects. Moreover, replacement of the silver reflective coating of an arclamp mirror by interference films

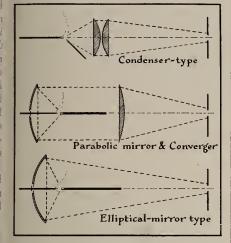


FIGURE 12.

permits transmission of the hot and useless infrared rays to the rear of the lamphouse while only the useful vissible light is reflected forward.

As stated previously, the satisfactory performance of a projection lamp depends as much upon directing the maximum amount of light to the projection lens as upon uniform illumination of the aperature area. Because of this, optical line-up of the lamp with the projector mechanism is a matter of paramount importance. A carelessly installed and adjusted lamp cannot give good screen light no matter how meticulously the arc is focused!

Alignment of an arclamp is a simple matter when the manufacturer's aligning tools are available. Even the use of a string stretched tight from the center of the mirror, through the positive carbon jaw, the center of the film aperture, to the center of the lens holder provides a good check. Experienced projectionists are able to obtain an accurate alignment by simple sighting through the lamp and mechanism with the aid of a pocket mirror and flashlight.

Concrete Floor Repair Kit

Projectionists at both indoor and outdoor theatres are boosting the Camp Patch-Crete Masonry Kit which does a fine job in repairing and restoring concrete flooring and allied surfaces. The substance requires no water, being ready for instant use, and it sets in ten minutes. It resists temperature changes, grease, oil, etc. From Camp Chemical Co., 2nd Ave. & 13th St., Brooklyn 15, N. Y.



Better Projection Pays!

That's why one of America's most famous theatres the New York Paramount—selected Simplex X.L projectors when it re-equipped for "The Young Lions".

Better projection comes from a better projector. And there's no finer projector being built than today's Simplex X.L. Here is the mechanism that's years ahead of the field. The only projector offering such exclusive features as a new *HI-SPEED* intermittent movement that gives more light at less cost and a new curved film gate that solves the problem of film buckle.

Little wonder, therefore, that whenever and wherever theatres select equipment—small town theatres as well as the huge Paramount—the choice is



PROJECTION and SOUND SYSTEMS





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Sharper Pictures, More Light on the Screen, Greater Contrast, and Greater Definition...and this under the most trying outdoor operating conditions. Actually 7 out of 10 new Drive-Ins install Super Snaplite Lenses...and more and more established Drive-Ins are turning to Super Snaplites. Ask for Bulletin No. 212, it gives you complete information on these lenses.



NORTHAMPTON, MASSACHUSETTS



'FOCUS-DRIFT'

(Continued from page 10)

corrected by simply refocusing the lens. Some of the factors involved in comparison of present acetate film with what nitrate would do under the same conditions are difficult to determine now, with no nitrate in use. There have been several changes in projection practice in recent years; these are listed in the accompanying table, which includes data based on projector conditions in top-quality theatres as reported in various surveys. These figures show that film requirements are undoubtedly more severe today than they were ten years ago.

Light Intensity Doubled

First, the film itself if subjected to more heat than was available in the days of nitrate. Total screen lumens available from the lamphouses used in these theatres have more than doubled in the last ten years. In addition, changes in projector shutters, sometimes accompanied by acceleration of the pull-down, have increased the percentage of total time during which the film is exposed to heat.

These two factors together mean that, on the average, film is heated more during projection now than it was in 1948; if nitrate film were still available, it, too, would be heated to the higher temperatures that acetate now reaches and its performance would be affected in the same way that the high temperatures affect acetate.

Larger Screen Magnifies Errors

In addition to the increased film heating, the image system in projection has itself become much more demanding. The width of projection screens has more than doubled, giving the audience an opportunity to see departures from ideal focus much more clearly. To obtain these larger pictures, projection lenses of shorter focus are used and improvements in lens design have permitted construction of lenses having much larger apertures. The change in focal length and aperture together have reduced the depth of focus of these average projection lenses from 10 mils to 4 mils.

In other words, the film in the aperture can now move less than one-half as far as was permitted in 1948 without showing a change in sharpness of the picture. Actually, the film not only moves as it did in 1948, but probably moves more because of the increase in projection light and in shutter time.

[Additional comment on focus-drift from the projection field, with particular reference to the foregoing, is solicited.—ED.]

Can You Beat 'Free'? Home Pay-TV Kaput

THE NATION'S first telemovie system at Bartlesville, Okla., suspended operations June 6. H. Griffing, Video Independent Theatres' president, announced his "reluctant decision" to close its cable theatre after nine months of operation.

"Ironically, our subscriber list is building steadily," he said. "Since Feb. 10 we averaged a weekly gain of 30 new connections. The gain, however, measured against continuing financial loss has not been enough to justify continuing without a system of metering viewing time. We now have 800 subscribers, a 140% rise since the change in price-program pattern in February. Current costs would require twice as many to break eyen."

Adds Up to 'Selectivity'

Video has made a number of mistakes in its pioneering efforts, but still believes in eventual success for the "home theatre." It hopes to resume when "conditions are more favorable—probably after (sic) the current glut of pre-1948 films on TV has waned." Griffing feels that a number of valuable lessons have been learned, including:

- 1. A "package of pictures" for a fixed charge is wrong. Charges must be by the picture, using a metering device that will register the programs viewed in each home. No adequate meter is available.
- 2. More economical operation is a "must" for engineering, utility pole contracts and studio facilities. Belief: 16-mm film can be shown as effectively as 35-mm.
- 3. TM cannot reach a maximum audience in competition with hundreds of "free" movies on TV.
- 4. Broadened program: an addition to movies. The multi-channel potential available via coaxial cable suggests sports events, educational and artistic programs, music, etc.

"Free TV" the Death Blow

Video started last September and, after a 4 weeks' trial, began charging \$9.50 a month for about 30 pictures on 2 channels. Subscribers rose to 600, but dropped as movies on TV reached "flood" proportions.

With subscriptions down to 300, the price went to \$4.95 for movies on only one channel; the second channel was for background music and adding community antenna service and Sunday matinee "art" films. Result: renewed interest and a gradual increase in subscribers surpassing the earlier mark. But, no acceptable meters; and operational costs decided the issue.



Your SIMPLEX Projector Mechanism represents a priceless investment. You bought it after long, careful study because you recognized it as the finest projector on the market.

Don't take chances with such an investment — the very success of your theatre depends upon its performance! When spare parts are necessary, insist on the best — insist on SIMPLEX parts!

From gears to sprockets, every part is made with the same precision and skill as the mechanism itself. By using only SIMPLEX parts, you can be certain of maintaining the high quality of performance that has made SIMPLEX the world's foremost projector mechanism!

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INDUSTRY BRIEFS

MOVE to bar nitrate film prints de-feated in Alberta (Canada) Assembly. Government cited number of foreign films on nitrate still in Calgary and Edmonton exchanges. Exhibs spawned bill as preliminary to big one-man-shift push. . . . Some 700 Paramount pre-1948 features sold to WCBS-TV in metropolitan N. Y. area for \$8,400,000. Boston and Omaha areas sold previously for \$2 and \$1 million, respectively. Music Corp. of A., seller, paid Par \$50 million for the lot. . . . Screen Directors Guild still pitching for slice of TV picture money on re-runs, threatening "suspension" of services. Producers, envisaging \$250 million for post-1948 pics, no like handing directors 10% thereof. . . . Final divorcement between Loew's theatre and production units postponed until August 1959. at earliest. Good chance it will never happen.

Paramount's greatest earning report

in history with an \$8,352,000 "net" for "first quarter" of this year. Almost \$7 million of this came from sale of movie backlog (pre-1948) to TV. . . . CINE-RAMA 1957 net was \$58,250, compared with \$118,477 for 1956. Operating income declined \$489,054 in one year, seeming to confirm view in some quarters that "travelogue" stuff will gradually decline and fizz out (IP said it first).... 62 local admission taxes have been repealed since Jan. 1, 1957, while 23 local taxes have been reduced. . . . 4 Schine theatres (upstate N. Y.) on the block under terms of U. S. consent decree brought no bids. . . . Latest gag by film distribs is "hard sell" on extended down-town runs for "big" pictures (which obviously vacuum area spending) on ba-sis that plan makes available "other" pictures for the poor subsequent-runs. (Horsefeathers.)

North Central Allied exhib group (Minneapolis) squawks: "confiscatory" 40 to 60% terms, failure to provide top pictures' prints for subsequent-runs until the "cream" (and most of the milk)

is gone, and forced upped admission scales which zoom distribs' take. . . . Statistical note: drive-ins play to a weekly attendance of about 4 times that of "conventional" theatres, altho admission price is less than one-half. . . . A TV-film exec quoted in N. Y. Herald-Tribune: "It may be a year, or two or three before all post-1948 features go to TV, but in the end the almighty buck will triumph." Maybe the guy hasn't heard of the growing conviction of admen that feature film TV showings, with interminable 5-minute "sponsor" breaks, have little if any product identification. . . Activated: a Nashville, Tenn., Section of SMPTE.

Importance of foreign market to American distribs: \$71,400,000 grossed at box-office on U. S. pictures in West Germany alone, about 1/3 the theatres' total take. . . . Members of International Ladies Garment Workers Union received \$49½ million (!) last year in health, welfare and retirement benefits. . . . 20th-Fox earned \$2,147,711 in first quarter this year. Biggest income slice was \$30 million for "film rentals, including TV". . . . Mexican unions feel they should give at least "moral support" to Hollywood unions' bleat about the many pics made in "foreign" lands (for much cheaper) but, then, los amigos have to eat, too, don't they?

Long-footage 20th-Fox prints will be split to provide "intermissions" at driveins. Aimed at giving concession stands a break. . . Sir Tom O'Brien, boss of Britain's counterpart of latse, wants a "little bit" of government intervention in film industry. Good guess is that if Tom gets it, he'll wind up with a "big bit" and possible nationalization of business—and his union.

Variety Clubs Good Deeds

Approximately 9,000 showmen, members of Variety Clubs International, including projection people, spent about \$2,900,000 during 1957 in their varied efforts to aid underprivileged children.

Approximately 250,000 individuals were directly benefitted by these welfare activities and countless other thousands were indirectly aided.

Showmen of Variety have, through the years, given generously of their time, talents, and money in the operation of these child welfare activities. Since the inception of Variety Clubs in 1928, approximately \$42,000,000 in charitable endeavors has been spent throughout the world where Variety Tents are located



- BRIGHTER LIGHT
- LONGER BURNING
- SHARPER PICTURE

Free Test Samples



- STEADIER LIGHT
- LESS ATTENTION
- PERFECT COLOR BALANCE

Free Carbon Chart



'Outside' Craft Activity

To the Editor of IP:

On a recent trip throughout the United States and Canada, when I had occasion to speak to many projectionists and stagehand craftsmen, I was impressed by the extraordinary and, it seems, steadily increasing extent to which these men are devoting themselves to extracurricular activities which stem from their unique experiences with light-producing equipment.

As you know, we have heen engaged

As you know, we have heen engaged for many years in the production of high-intensity spot lamps and slide projectors which give giant images on outdoor locations; and it was refreshing to learn from these men that they were quick to recognize this as a natural extension of their activities in the pro-

fessional theatrical field.

So impressed was I by this demonstration of craft enterprise that immediately upon my return to our factory I caused to he published an 8-page folder which sets forth in detail the requisites for the successful presentation of both indoor spot lighting and outdoor slide projection, the latter in either daylight or at night.

By the same token, and in recognition of our close association with and as a recipient of many favors at the hands of the organized craft, I would ask you to please state in your columns the availability of this bulletin, free of charge, to any of your readers who request it. A postcard to the address given below will insure prompt delivery.

J. P. LATIL President, Genarco. Inc. 97-04 Sutphin Blvd., Jamaica 35, N. Y.

Note: Mr. Latil's observations anent the increasing interest of theatrical craftsmen in income-producing activities outside the show business field have long since been no secret to IP nor to those whose business it is to spur such activity through the publication of books (see "Book Review" in this issue) and the production of equipment which in streamlined form is suitable not only for business applications but also eminently suitable for the rapidly expanding "theatre in the home."

Thanks to Mr. L.; and we hope that many IP readers will take advantage of his offer.

Wide-Screen Focus Problem

To the Editor of IP:

I have been particularly interested in reading in recent issues of IP comment relating to the difficulty attendant upon the focusing of wide-screen pictures, particularly CinemaScope. Whether the fault lies with the film stock itself, the heat on CS lens, or some other factor not heretofore identified, the fact remains that this still is a serious hindrance to the effective presentation of current wide-screen releases—especially those which run more than 100 minutes.

It would seem that those who produce and distribute and charge unconscionable prices for their product (see the Monthly Chat in IP for April last) should demonstrate some interest in the final delivery of their product to the screen—which is the only area in which they can translate their "artistic" efforts into that money which enables them and the rest of us to keep this industry going.

VIRGIL MESSNER R.D. 2, Greenacres, Calif.

Note: Even a cursory inspection of IP during the past few months will prove that we are not only aware of this acute projection problem but have devoted not a little space to the practical methods which may be applied to, if not solve, the problem, or at least minimize it.

It so happens that in this issue there

WANTED . . .

We are expanding and have an opening for an experienced IA Theatre Sound Engineer with a good technical background. Applications held in strictest confidence.

NORTHWEST SOUND SERVICE, INC. 73 Glenwood Ave., Minneapolis 3, Minn.

appear data in the form of the article "Focus-Drift" and the contribution by Robert A. Mitchell which bear directly upon this point. The day has long since passed when projectionists may reject out-of-hand a print which presents unusual operating difficulties; and it now remains to be seen only if the producers of the much-ballhooed "hlock-busters" think more of the few lines of publicity they get in the trade and daily press than they do of their productive efforts as transmitted to the paying patron—for their and our money.

BOOK REVIEW

Industrial control circuits, by Sidney Platt; $8\frac{1}{2}$ x $5\frac{1}{2}$ inches, 174 pages, plus 20-page index, profusely illustrated. John F. Rider Publishing, 116 W. 14th St., N.Y. City, 11. Price: \$3.90.

Many projectionists engage in extracurricular activities based on their daily and intimate engagement in the electronic field, not to mention magnetic recording and reproduction.

A fundamental knowledge of electronics is all that is required to gain complete familiarity with the basics of this book. The author looks at the subject through the eyes of a person with little or no knowledge of this field. explaining the circuits that govern the initiation, processing and finishing stages of industrial electronic equipment in a straightforward, easy-to-understand manner.

Specific industrial applications are used to graphically describe the problems of industrial control. Every phase of control circuits is discussed, including electronic relay control and timing circuits, photoelectric control, power controls and industrial control instrumentation.

Comprehensive and very good.-J.J.F.



OBITUARIES

MILLICAN, ARTHUR, 59, president of Local 173, Toronto, Ont., Canada, was fatally stricken with a heart attack on May 12 shortly after returning to his office from a wage-scale negotiation. A member of the Local for 42 years, Milligan held every elective office including the presidency. Widely known in projectionist circles throughout Canada, he also served as secretary-treasurer of District No. 11, which comprises all IA Local Unions in the provinces of Ontario, Quebec, the Maritimes, and Newfoundland.

Milligan was a veteran of World War I, serving overseas with the 75th Canadian Battalion, where he was wounded and gassed in chemical warfare attacks. He was a member of the Motion Picture Pioneers and of the Canadian Famous Players 25-Year Club. He was a Mason and a life member of Occident Lodge, AF & AM. Survivors are his wife and two married daughters.

COBOURN, PERCY, 71, longtime member of Local 228, Toledo, Ohio, died last month. He was projectionist at the Westwood Theatre in Toledo until illness forced his retirement. He is survived by his wife, two sons, and two daughters. One of his sons, Ralph, is also a member of Local 228.

THORNBERRY, H. H., former president of Local 303, Hamilton, Ont., Canada, was killed recently in a fall from the Hamilton High Level Bridge. He served four terms as president of the Local, and was a member of the Canadian Motion Picture Pioneers. His wife and a son survive him.

Myers, Osborne R., 65, member of St. Louis Local 143, died April 2 at the Christian Hospital. A member of the Local since 1910, he had been employed for many years at the Wellston Theatre. He is survived by his wife and three sons. Two of his sons, Donald G. and Glennon H., are also members of the St. Louis Local.

Tape Bonanza in TV

The recording and broadcasting of TV programs and commercials on electronic tape rather than film has grown into one of TV's major developments, posing far-reaching changes and problems for the industry. The three TV networks are using tape to solve the problem of delayed broadcasts necessitated by the various time zones across the country. The tape automatically records programs and re-broadcasts them at appropriate times for the Mountain and Pacific states.

Some 35 TV stations are now using tape recordings. Several companies are ready to produce TV commercials on videotape, with some national advertisers already using it. RCA has unveiled its line of tape recorders, both black-and-white and color.

Before the introduction of tape, any non-live broadcasts on TV had to be

on film. Videotape's big advantages include a *superior* picture quality and the fact that shows can be put on tape—over long distances—and played back immediately without any processing. It also provides a ready means for storing live shows for future re-broadcast. This has especially important implications for stations.

This big boon to TV also threatens a big headache in form of craft jurisdictional strife between IATSE, NABET, and IBEW, with the IA having won the first serious brush in the N. Y. studios.

Strong Spots to Brussels

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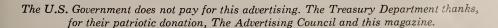
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Monthly Chat

Non-Standard Standards

NE of the most confusing and discouraging aspects of modern motion pictures deserves particular and emphatic recognition—the non-uniformity of standards and practice. It is definitely not true, as was stated recently in the magazine "Standards," (American Standards Association) that "moving pictures . . . are probably the most completely standardized product circulating through the channels of world commerce." The plethora of different apertures in any given projection room, to mention only one item, proves this beyond doubt.

Almost any day now one may expect some producer to announce that his "standard" film size will be 63.45-mm wide, will have 5½ sprocket perforations per frame, will show pictures having an aspect ratio of 3.14, and will have seven sound tracks—four will be magnetic and three optical.

It is small wonder that with so many film sizes, aspect ratios, types of sound track, and the like, that even skilled personnel sometimes become thoroughly confused. Concurrent with the existence of so many "standards" and the announced intent in some quarters to introduce still more new film sizes which require new exhibition techniques is the campaign by exhibitor forces to derogate the projectionist in terms of technique and men-per-shift. This campaign is pushed relentlessly even though it is unanimously agreed that no release is worth a plug nickel until it is properly presented via the projection process.

Of late there has been a rash of critical comment by seasoned movie reviewers for newspapers and general magazines relative to deficiencies in the screen image and its accompanying sound. So widespread have been these complaints—"irritating" being a favorite word among these critics—that it would be a brazen lie for any exhibitor association to say that the situation had not come to its notice. Exhibitors know alright; but it seems that their energies are channeled into decrying TV and bemoaning (without success) the distributors' demand for 63 cents per ticket sold!

Dramatic Content or Spectacle?

The industry may well ask itself whether dramatic effects and entertainment value really require so many different types and sizes of film and projection equipment. Would it not be possible to capture and retain the interest of an audience through the use of at most two "standards"—the "big" screen and the moderate-sized one?

What is obviously needed is more dramatic content in the screen image, even though it be a scenic vista. rather than an enlargement of small segments, including the members of the cast. On all sides we hear peans of praise for screen sizes ranging from 60 to 90 feet, for "stereophonic" sound (which it truly isn't and wouldn't make any difference if it were) and for "glorious" color rendition. This is nonsense.

One of the most effective tools for infusing drama into a motion picture is, for example, the closeup, the intensity of which derives from the fact that the screen establishes a definite, circumscribed area of vision. Alas, this tool has been corroded through disuse. As for the other items, well, we are assaulting our customers' ears with a cacophony of noise, and we are washing out by magnification our color values.

Gratuitously, we suggest that theatre owners ponder conditions within their establishments as a means of combatting those forces, including TV, concerning which they are now so vociferously articulate. One man's salary per week has never to our knowledge effected the shuttering of any motion picture theatre.—James J. Finn.





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Demonstration of Blown Arc Impresses SMPTE Members

Hollywood-An impressive demonstration of the Strong "blown arc" was staged for an audience of drive-in theatre owners, executives and projectionists by the Strong Light Caravan last Wednesday night at the Laurel Drive-In Theatre in the San Fernando Valley, and the following night the demonstration was repeated for about 75 delegates to convention of the Society of Motion Prand Television Engineers. The d were taken to the theatre on spec

The size of the turnout - about 100 ent at the Wednesday showing - in great interest in this new product

theatre equipme

with the blown are; two identical prints were projected and changeovers back and forth were made on each scene so quickly that an almost instantaneous comparison could be made by the

Comments of the viewers were to the effect that the quality of the picture on the projector equipped with the blown arc approached that of an indoor screen both in brightness and discernible details. Several of the viewers brought along portable brightness meters and the concensus among them was that the brightness of the picture lighted by the blown arc was about twice that of the picture projected on the theatre's ipment.

Equipment News

-Film Daily



INTERNATIONAL PROJECTIONIST

Volume 33 JULY 1958 Number 7

Sprockets and Film Perforations

A roundup of current thinking on an old but, seemingly, ever-new problem incident to the projection process.

By ROBERT A. MITCHELL

MOTION - PICTURE photography and projection depend upon accurate transport of the film at a constant rate of travel (90 feet per minute for 35-mm sound film). In addition, the film must be moved intermittently (24 ³/₄-inch "frames" per second) through the optical portion of the camera or projector.

To effect transport of the film and insure precise intermittent registration at the aperture, sprockets and claw-shuttles are employed; and the margins of the film stock, both negative and positive, are perforated with the highest possible degree of accuracy.

The fundamental perforation specifications of standard 35-mm motion-picture film (4 holes per frame in each margin) are very old (Thomas A. Edison in 1891). Edison's film-width and perforation standards were combined with the Lumière brothers' frame rate of 16 per second by Oskar Messter in 1896. These specifications remained unchanged until the advent of sound pictures in 1928, when the frame rate was increased to 24 per second. Not even magnetic-track CinemaScope has altered the basic 4-holesper-frame perforation standard!

Negative & Positive Perforations

The shape and specific dimensions of the sprocket holes have nevertheless been varied, particularly as the studios and independent laboratories did their own perforating in the early days of the art. The first "standard" film perforations had straight pull-down edges and bowed sides. This shape, now known as the nega-

tive-type perforation, was used exclusively until the early 1920's, when a rectangular perforation having straight sides and rounded corners—the so-called "positive-type" perforation—came into being for projection prints, to avoid excessive "checking" at the perforation corners. Interestingly, newsreels were the first to give the positive perforation an extensive field test in the days of silent movies.

Negative perforations still are used to some extent for camera films; but positive perforations now hold the field for release prints. Negative perforations vanished from the projection room when Technicolor and a few other color print laboratories abandoned them about 1950.

Perforation Pitch and Shrinkage

Sprocket teeth in cameras, printers, and projectors are, of course, dimensioned on the basis of prevailing perforation standards. Most sprocket teeth are somewhat smaller than the film perforations, tapered to permit smooth engagement and disengagement. Their spacing around the rim of the sprocket is governed by the "pitch," or distance apart, of the perforations when the film has attained its average maximum shrinkage.

Because there are 4 sprocket holes per 3/4-inch film frame, the pitch of the perforations is 0.75/4 = 0.1875 inch—the distance from the pull-down edge of one perforation to the corresponding adjoining pull-down edge. In present-day film-manufacturing practice, however, a frame distance of 0.748 inch is adopted, hence the standard raw-stock perforation pitch

of 0.748/4 = 0.187 inch—the pitch used by Eastman, Agfa, DuPont, Ansco, Gevaert, Ilford, and other film manufacturers.

Film shrinkage is much less severe with modern triacetate safety stock than with the earliest nitrate stock. In the old days, film often lost as much as 1% of its total length by shrinkage: the later nitrate and the present triacetate film seldom shrinks more than 0.5% even under the most adverse conditions. Taking a 0.5% shrinkage as the maximum, therefore, the resulting pitch of the sprocket holes (and the maximum allowable spacing of the sprocket teeth) turns out to be $0.187 \times 99.5\% = 0.186$ inch.

Sprocket Diameter

Employing a tooth pitch of 0.186 inch in the case of a 16-tooth sprocket, the required circumference of the sprocket is $0.186 \times 16 = 2.976$ inches,

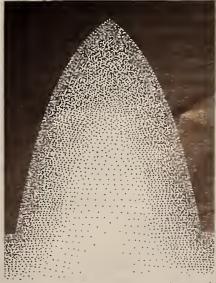


FIG. 1. Cross-section of a sprocket tooth, showing depth of hardening (shaded areas).

equivalent to a diameter of $2.976/\pi = 0.947$ inch. A standard diameter of 0.935 inch prevailed for projector intermittent sprockets in the days of nitrate film, a diameter which accommodates the film perfectly when it has undergone a shrinkage of 1.2%. With the advent of low-shrinkage nitrate and triacetate films, however, many projector manufacturers adopted larger sprocket diameters (0.943 and 0.945 inch).

The Greek letter π standing sixteenth in that alphabet, and corresponding to the English P. It is used in mathematics to represent the ratio of the circumference of a circle to the diameter, the numerical value of which, carried to six decimal places, is 3.141592.

The 0.945-inch diameter is now generally approved for intermittent sprockets to provide a better mesh with the perforations and longer print life.

All of the older American projectors used 16-tooth sprockets throughout, but the great majority of European manufacturers have always preferred 32-tooth upper and lower feed sprockets for a more satisfactory film wrap with less strain on the sprocket holes when large reels 2-to-5000 ft. are used.

Only one American manufacturer uses sprockets of large size, namely, the 24-tooth feed and takeup sprockets in the Simplex X-L. The 24-tooth size, although overly cautious, is at least a step in the right direction. The Motiograph Mirrophonic soundhead employs a 32-tooth combination sound-and-holdback sprocket.

Different sprockets are ordered for different parts of a projector, the intermittent and sound sprockets being the most expensive. This is because these two sprockets must be made with an accuracy not required for the feed, takeup, and holdback sprockets. The intermittent sprocket must be made as light in weight as possible to prevent straining the geneva star and cam; it must be free from "lop-sidedness" and other deformities; and its teeth must be spaced to a tolerance of 1/10,000 inch to insure perfect registration of the frames over the aperture. A defective intermittent sprocket produces "jumpy" pictures.

The sound sprocket requires a similar high degree of precision in its manufacture; but because it rotates with a constant speed, it does not need to be light in weight. A faulty sound

Kodak Film Cleaner-Lubricant

A new Kodak movie film cleaner with lubricant added has been announced by Eastman. Like the two-way floor wax that polishes as it cleans, the new cleaner is double-acting. It removes dirt and old lubricant from the film and restores the proper amount of lubricant.

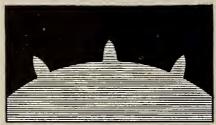
The lubricant eliminates stickiness which causes unsteadiness of the picture image as it passes through the film gate, and sound distortion as the film passes over the sound-scanning mechanism. It prolongs the life of the film by minimizing the causes of damage. This new cleaner can be used on film striped with Kodak Sonotrack Coating with no harm to the soundtrack.

The cleaner (with lubricant) is available from Kodak dealers and lists at 90 cents per four-ounce bottle.

sprocket causes sound flutter—"gargle" and "whiskers"—in direct film-drive soundheads.

How Sprockets Are Made

The manufacture of a high-quality film sprocket is simple even though the finest steel and accurate work are demanded. The "stock" consists of a



Unused sprocket



Worn-off teeth



Undercut teeth

FIG. 2. The effects of wear on the profile of sprocket teeth.

cylinder of steel having a diameter somewhat greater than the diameter of the finished sprocket. The sprocket is then shaped in a lathe to its final form, except for flanges in place of teeth. After "rough turning," some manufacturers then bore and finish the shafthole through the axis of the sprocket. Final turning is then done in a special high-precision lathe with the sprocket centered by its shaft-hole to avoid lop-sidedness.

The teeth are finally milled by means of cutting and grinding machines. The accuracy with which the teeth are ground to their final form is a matter of paramount importance.

The best sprockets are made of tool steel. Ordinary sprockets are made of high-carbon steel, which may be surface-hardened either prior to, or after, the film-contacting rims and teeth are ground. Recent tests of tooth hardness and observations of tooth wear indicate that intermittent sprockets perform more reliably when they are hardened after final grinding.

Hardening and 6-cycle 'Jump'

Commonly known is the fact that the framing devices of Simplex projectors should not be left in midway position at all times, but occasionally changed to insure uniform wear of the intermittent-sprocket teeth. If the projector be operated for long periods of time with the framer in the same position, uneven wear of the sprocket teeth may introduce 6-cycle image "dancing" when the picture is framed up or down on the screen to rectify an accidental misframe.

This rapid picture "jump" is exactly the same as the 6-cycle jump caused by a lop-sided sprocket or a sprung starwheel shaft. While IP was the first to advise changing the position of the framer at frequent intervals, European projector manufacturers are now issuing the same advice.

'Hardening' Variations

Tests have now established that this trouble is a defect of the intermittent sprocket. Because the hardening process hardens only the *surface* of the metal, the *center* of each tooth remaining comparatively soft (Fig. 1), grinding the teeth after hardening easily results in the production of teeth of different hardness around the sprocket. Although the differences in hardness are too slight to be detectable by ordinary direct testing methods, they are nevertheless great enough to result in variations in tooth wear in a sprocket

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Here is what happens: the teeth which perform the pull-down operation at the point of maximum intermittent acceleration get the most wear, and the teeth which contact the film perforations during the deceleration to effect registration of the frames receive the least wear. Now, when some teeth are slightly softer than others, wearing unevenly, reframing the picture may bring the uneven teeth around to effect the registration at the end of the intermittent deceleration. Film registration will then be imperfect, the picture rising and falling at each revolution of the sprocket. The sprocket revolves at a rate of 6 times each second, hence the 6-cycle picture jump.

To repeat: Change the position of the framing knob of Simplex and similar projectors at least once a week. One can easily test the condition of intermittent sprockets by projecting a reel of pictures known to be rocksteady on the film. If 6-cycle jiggle of the picture appears when you frame all the way up or down, replace the intermittent sprockets as soon as possible and periodically change the position of the framer!

This advice may be disregarded by users of Motiograph projectors, however. Framing is accomplished in the Motiograph by raising and lowering the entire intermittent movement with its sprocket (instead of by rotating the movement). In the Motiograph, therefore, the same sprocket teeth always perform the same function, whether pulling down the film at the peak of intermittent acceleration or registering it accurately at the beginning of the "dwell" period. Many of the older projectors, including the Holmes and Powers, employed similar framers.

Aluminum Sprockets Disapproved

Sprockets were sometimes made of soft alloys, such as brass, in the very early days of projection, but steel was always preferred for intermittent sprockets. In fact, there is nothing better than good alloy tool steel from which to make sprockets. Steel may be machined with great accuracy, and is hard, durable, and long-lasting. Even ordinary steels of high grade may be hardened by tempering, carbiding, and nitriding to make them extremely resistant to wear.

Regardless of "old wives' tales" bandied about in the projection field, hard sprockets are definitely superior to soft sprockets. An intermittent

Anamorphic Still is Anamorphosis

Anamorphosis: A distorted representation of an object, unrecognizable except when viewed through a polyhedron or from a particular point, or when reflected from a specially constructed mirror, as an anamorphoscope.

CinemaScope and other anamorphic projection systems have admittedly fallen into disfavor among many technicians who recognize their limitations. Because of the difficulties encountered in the optical design of anamorphic camera lenses, CinemaScope pictures often appear slightly distorted. Both the camera lenses and the projection attachments may be responsible for blurriness toward the sides of the screen. Fadeaway is increased, and anamorphic projection attachments of all types waste all of the extra light transmitted by the slightly larger Cinemascope aperture.

The screen-lumen data provided by lamp manufacturers for CinemaScope projection are obtained from light measurements made without anamorphic attachments on the projector, and should be weighed carefully by the sophisticated projectionist.

Both large-negative systems of photography and improved methods of conventional 35-mm photography and film printing have proved conclusively that the use of anamorphic optics is an unnecessary complication in the theatrical movie field.

sprocket made of copper or brass would not last very long or give satisfactory service. Similarly, hardened steel intermittent sprockets give better service than those which have not been adequately hardened. Hard or soft, all sprocket teeth are subject to "undercutting" (Fig. 2), but hard teeth have a longer life. It is very rare for sprocket teeth to wear down evenly without becoming notched at the base, or thickest, part.

Tool steels with a hardness of at least 7 on the basis of 10 for diamond should be used for sprockets: feed and takeup sprockets having a hardness of only $4\frac{1}{2}$ are very common. These develop undercutting of the teeth in a very short time. The very hardest tool steels have a hardness of about 9.

The use of CinemaScope magnetic-track release prints has induced projector manufacturers to investigate various non-magnetic alloys as possible materials from which to make sprockets. Steel is essentially iron, and iron is a highly magnetic substance. Unless carefully demagnetized at frequent intervals, steel sprockets may cause marked deterioration of magnetic soundtracks.

To eliminate this risk to magnetic tracks and make the "degaussing" of sprockets unnecessary, aluminum-alloy sprockets have been made and actually placed on the market. From the point of view of projection quality, the use of aluminum intermittent sprockets is manifestly unsatisfactory.

The hardness of the new aluminum intermittent sprockets is approximately 3½, which is scarcely harder than brass. Wear of the aluminum teeth is noticeably irregular, resulting in severe 6-cycle picture "jump" after a short period of use.

'Foxhole' Sprockets Unsatisfactory

Use of the narrow-tooth Cinema-Scope type of sprocket is mandatory when magnetic-track prints are played. The so-called "foxhole" CinemaScope film perforation is compared with the standard positive perforation in Fig. 3. The "foxhole" perforation is just a trifle too small to be used with regular sprockets, hence the need to replace all standard sprockets in the projectors in order to use either "straight magnetic" or combination magnetic-optical ("magoptical") CinemaScope prints.

The use of an undersize film perforation is an outstanding example of technological lunacy in the industry, inasmuch as magnetic-track CinemaScope could have been conformed to the standard perforation without appreciable loss of picture width.

Narrow-tooth sprockets are undoubtedly harmful to regular prints. CinemaScope magnetic-track prints (which must be threaded through "penthouse" magnetic reproducers, of course) have slightly less than half the useful life of standard optical-track prints played exclusively in

(Continued on page 18)



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Optimum Projection Viewing Conditions

The second in a series of excerpts from a presentation given originally before The Royal Photographic Society of Great Britain and, perforce, printed in the official Royal Photographic Journal. The address by Dr. Hartridge, a scientist of international repute, is available in its entirety from the Society in either the complete Journal at 4s (approx. \$0.56) or in reprint form (approx. \$0.35), both postpaid, at 16 Princess Gate, London S.W. 7, England.

By H. HARTRIDGE*

Color-blindness, much more common in men than in women, presents to the scientist a series of complex and baffling problems. We do not know the precise mechanism of human colorvision, but until we do, how can we describe in what way the mechanism has gone wrong when color-blindness occurs? Fortunately, from the practical standpoint, the basic facts can be stated briefly as follows:

When people who have normal colorperception look at a spectrum (produced from white light) by means of a suitable spectroscope, they see a band which gradually changes color as the eye passes along it. During its progress the eye can be halted from time to time and a name can be given to the color at which the eye is looking. Normalviewing people usually see 7 such colors:

red green
orange blue-green
yellow blue and violet

Color-blind people see fewer colors than these, and apparently even these colors look less definite to them than they do to a normal-viewing person.

Extreme Color-Blind Types

There are two extreme types of color-blind persons—one common, the other rare. When the common type look at a spectrum they see two colors only—yellow and blue. The yellow replaced what the persons with normal color-vision would call

red, orange, yellow, and green

The blue replaces the normal-viewer's blue and violet. In between the yellow and the blue areas lies a neutral grey area which corresponds in position in the spectrum to the blue-green.

Note that both red and green look yellow to those color-blind subjects and, in consequence, look alike; for this reason this type of color-blindness is often called "red-green blindness." It is important that the presence of this defect be recognized because such persons, since they cannot distinguish a danger signal from an all-clear one, represent a definite hazard not only to themselves but to others.

The second, and much rarer, type of color-blind people also see only two colors when they look at a normal spectrum:

red (or crimson) green or blue-green

The red is seen in the spectrum where the "normal" person would see red and orange; the green when the "normal" person would see green, blue-green, and blue. Between red and green, the colorblind person sees a neutral grey area which corresponds in spectral position with the yellow. There is a second neutral-grey area in the violet. These color-blind persons are called "blue blind." They should, of course, be called "blue-and-yellow blind." These people can identify red and green signals.

Intermediate Color-Blindness

There are other types of color-blind persons beside these, and there are interesting intermediate types which lie between the normal and the abnormal. Some of these subjects can identify red objects situated among green ones (cherries on a tree) when light is good, and objects near at hand, but cannot do so when light is poor or when they are viewed at a distance. These people are "color-deficient," the deficiency being of an intermediate kind, somewhere between normal sight and complete red-green blindness.

These intermediate types are of special interest when considering the projection of color images, and even persons who have "normal" color vision may suffer from intermediate types of such a deficiency.

[To BE CONTINUED]

Thought for Tomorrow

The electric power companies are expanding rapidly to meet the demands of population shifts, especially in newly-developed suburban area—thus giving Technical Service (Livonia, Mich.) a thought for tomorrow in connection with exciter lamps for sound reproduction. purposes.

When new power equipment is installed, either in a new community or to modernize existing facilities, it is designed to accommodate predicted requisites of perhaps 10 or 15 years from now. Result: high line voltage in many areas, with a consequence of shorter exciter lamp life.

Suggestion: replace 4-volt lamps with 6-volt units, the latter being directly interchangeable. If sound volume suffers as a result of the switch, revert to use of the 4-volt lamp.

Too Much

Light

Pale salmon

Pale yellow

green

Grey-green Pale blue

Blue

Blue

V. Pale yellow-

Pale yellow-green

Salmon

Normal

Color

Too Little Light

Dark crimson

Crimson Red Pink Orange White Yellow Yellow-green V. Pale bluegreen -Pale blue-green Green Blue-green Blue-green Dark blue-green Blue Violet Dark grey

PROJECTION DIFFERENTIALS

How light at varying levels can mean many different things to different people.

Purple

^{*} Master of Arts, Doctor of Medicine, Doctor of Science, and Fellow of The Royal Photographic Society; also, Emeritus Professor of Physiology, University of London, and Gresham Professor of Physics, Gresham College, London.

Gate and Shutter Characteristics

The second of two articles detailing film behavior in straight and curved gates.

By WILLY BORBERG

General Precision Laboratory, Inc.

FIG. 5: the center of the entering frame in the curved gate about 0.006 inches above zero. By the end of the second exposure it is near 0.010 inches negative. The total excursion is only 0.016 inches as against about 0.024 inches in a straight gate under the same light conditions shown in Fig. 1. The most important improvement, however, is the fact that the average focus position of the lens is only 0.004 inches negative, in contrast to 0.016 inches with a straight gate. This average focus shift towards zero means that the center and sides of the film frames are close to the curvature of the field of the projection lens, resulting in good across-the-screen focus.

Figure 6 is a photograph which, when compared with Fig. 2, reveals another step forward. The disturbances after pulldown are found to be reduced in magnitude as well as in duration.

Figure 7 is a curve made by running a loop having color and blackand-white film patched together. Both types of film show the same pattern, but black-and-white exceeds in depth of buckle.

Figure 8 gives a comparison of focus across the screen between a straight and a curved gate with con-

† SMPTE Journal, October, 1957

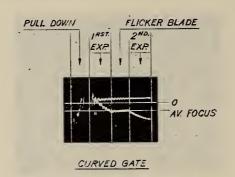


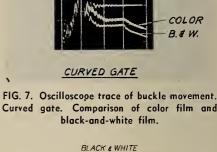
FIG. 6. Oscilloscope trace of buckle movement. Curved gate.

ventional two bladed shutter projection. The black-and-white test film used here was not new; it had been run previously about 15 times. The center zone of the screen on the left shows a fairly deep negative position. The performance shown on the right, with curved gate, is far better.

Three-Bladed Shutter

In a related investigation the use of 3-bladed shutters for flicker reduction was examined; and the resultant screen image quality, as affected by buckling during this differing projection cycle, in which we have three exposures per film frame instead of two with the 2-bladed shutter, was studied.

Preview rooms, with relatively small screens at high light levels, are often equipped with 3-bladed shutters; and the 72-cycle flicker frequency gives comfortable viewing conditions.



EXP

PULL DOWN

FLICKER BLADE

Curved gate. Comparison of color film and

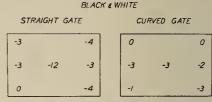
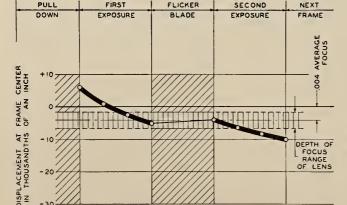


FIG. 8. Across-the-screen focus conditions. Straight gate against curved gate. Numbers are thousandths of an inch lens displacement.

The light flux at the film gate is relatively small, so that buckling does not affect the screen image adversely. The large hard-top theatres find it desirable to do something about flicker particularly for the front row customers. The wider viewing angle encountered in the front rows can cause peripheral flicker sensations. These houses with large screens may, however, require a light flux at the gate close to the limit of what the film can handle.

Operation with a 3-bladed shutter, and the standard 90 degree movement in the mechanism, would mean a reduction of light transmission from 54 per cent to about 27 per cent. Only a higher speed movement can offset these intolerable losses.

An experimental setup with a fast 72 degree movement and a 3-bladed shutter, giving ghost-free performance, gave a light transmission of 36 per cent. Thus, in order to have a screen light level equal to what the 2-bladed shutter produces, it is necessary to raise the light output from the projection lamp. This increases the instantaneous light and radiation intensity on the film at the



BLACK & WHITE FILM CURVED GATE

FIG. 5. Film displacement due to buckling at center of frame. Curved aate.

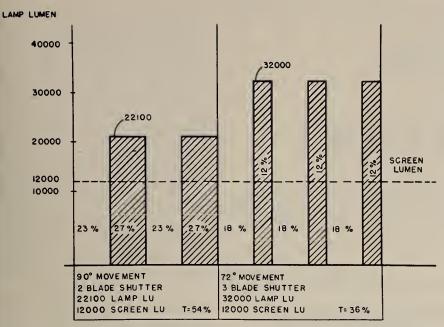


FIG. 9. Comparison of light pulses on film for same screen illumination with 2- and 3bladed shutters.

aperture, but for a shorter duration per flash.

Figure 9 shows the difference in lamp output required to offset the lower transmission efficiency of a 3-bladed shutter mechanism, providing the same screen light level as formerly obtained with a 2-bladed mechanism.

Steep Buckle Delineated

Figure 10 shows how steeply the film frame buckles in each of the three exposure periods. The average focus position of the lens crosses only through the second exposure. During

the first and third exposure periods the film plane is well beyond the range of depth of field of the lens. The result is not a very pleasant one on the screen.

Figure 11 indicates some improvement when guiding the film through the curved gate. The screen definition is still not satisfactory. Operation with 3-bladed shutters at high light levels, with the high specific radiation in short pulse offers a new problem which awaits solution.

Conclusion

Improvements effected by the curved gate were found to be:

- (1) Reduction of buckle by about 30 to 40 per cent, which has the effect of keeping the film plane within the depth-of-field range of the lens for longer time intervals.
- (2) The average focus position of the lens lies closer to the zero plane resulting in better center-to-side focus on the screen.
- (3) Reduced film frame motion after pulldown; less disturbance by the strain pattern.
- (4) Badly buckled films, which could not be held in focus because of buckling negatively and positively, can, with the curved gate, be shown with fully acceptable results.

Acrylic Latex Paint Solves Drive-In Screen Problem

Keeping Florida's drive-in movie screens white is a difficult maintenance job. Sub-tropical sunshine, salt air, drenching rains and fast-growing mildew provide toughest exposure conditions in the U. S. Introduction of acrylic latex for masonry paints in 1953 provided the first satisfactory answer to this problem. Nearly all of southern Florida's big outdoor screens have been coated with acrylic paint since 1954.

No Flaking or Chipping

A 45- x 90-foot screen at Miami's Turnpike Drive-In is a case in point. It is of reinforced concrete of conventional screen size with wings of asbestos board added on sides. Coated with acrylic paint four years ago, the screen still maintains uniform whiteness on both asbestos board and concrete, and it has not flaked, peeled or chipped.

Formula for the paint is Rohm & Haas Co.'s (Philadelphia) Rhoplex AC-33

acrylic latex.



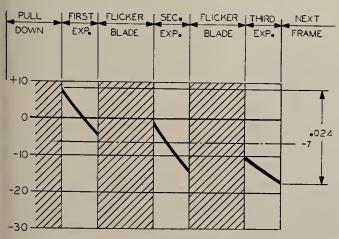


FIG. 10. Film displacement due to buckling at center of frame.
3-bladed shutter. Straight gate.

BLACK & WHITE FILM

CURVED GATE 72° MOVEMENT, 3 BLADE SHUTTER

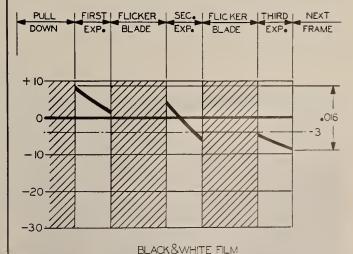


FIG. 11. Film displacement due to buckling at center of frame.

3-bladed shutter. Curved gate.

In The SPOTLIGHT

The function of this department is to provide a forum for the exchange of news and views relative to individual and group activities by members of the organized projectionist craft and its affiliates. Contributions relative to technical and social phases of craft activity are invited.

Strong's 'Light Caravan' Home After Epochal Tour

CERTAINLY our chest expands when one of our own pulls off a coup which reflects great credit on the craft as a whole, but never have we had more reason to swell that cavity than when Ray Shuff, member of IA Local 364, Akron, Ohio, pulled into Toledo late one night last month after completing one of the most remarkable safaris ever spread upon the record of professional projection "know how."

For more than 15,000 miles across the United States, many

of them tedious in the extreme, Shuff piloted and generally oversaw the efficient operation of an ultra-modern projection room on wheels.

In his care was equipment which, judged by the most modern standards, would justifiably excite pride on the part of an owner of the finest motion picture theatre in America. Witness among the major units:

Projection De-Luxe on Wheels

Simplex 5-to-1 intermittent movement projectors, the ultra-modern Strong "blown" arclamp, a multiple-channel sound reproducing system, ample power supply equipment to meet the need of any local situation, a special water-cooling system, and all the sundry items necessary for the operation of a top-high projection room. All this—and mobility too!

The next time you fellows feel the floor quiver beneath your feet, think of Shuff.

Just a few Shuff's reminiscences:

"Left the Strong plant in Toledo in a high wind and, it seems, the gods disported themselves in stormy glee all along the 15,000-mile route of our trip. Our green-and-yellow truck cover unfailingly excited the attention of the children along the sidewalks, the invariable question being 'When is the circus coming to town?'

"We were handling the first, to our knowledge, modern projection room on wheels, represented by the new Strong 'blown' arclamp, the latest Simplex projectors, spare film magazines, lens adapters, a special water-cooling unit, ample units to handle any local power supply problem we might encounter, and a self-powered inter-com unit which enabled us to sync-up the simultaneous presentation of two reels of Cinema-Scope film in both color and black-andwhite

"By using the inter-com we were able to start both projectors (our own and that which was permanently installed) at a count-down of 3. Moreover, we alternated the screen image between both projection setups.

"We elected the toughest projection test of all, a split-aperture presentation. We felt that by splitting the screen image we could present the greatest contrast between the light-and-dark phases of a given print of identical densities. The contrast between our arc and that of the permanent installation was startling—like walking from a well-lighted room into a neutral-gray area.

"The trip was illuminating in more ways than one—quite apart from the fact that I was 'selling' light in the form of the Strong 'blown' arc. It conveyed to me as nothing else could the remarkable but strictly indefinable unity of the projection craft (must I mention the stagehands?). Everywhere we went that IA card was the passport to cooperation which may only be ascribed to a true fellowship. For this, I and my

RAY SHUFF Major damo of the Caravan, this long-time member af Akron, Ohio, Local 364, chalked up a projectian "first."



fellow workers are grateful; I should have known from the start.

"All in all, I feel that this trip was a dramatic exposition of a manufacturer's confidence in super-fine projection equipment—one that has never been so effectively merchandised until now, not only for his commercial benefit but also because it acquainted so many people with the difference between pushbutton operation, so-called, and good projection technique."

Buys Projection Optics Co.

Charles Beseler Co., East Orange, N. J., manufacturer of a wide line of audio-visual equipment, has purchased the Projection Optics Co., manufacturer of theatre projection lenses and anamorphic adaptors, from Fred E. Aufhauser. Projection Optics will continue to operate in its Rochester plant under the direction of Philip Berman, of the Beseler Co. who has been named president. Aufhauser will remain with the company for a few months as a consultant before announcing his future plans.



PROJECTION ON WHEELS

This truck provided the mability caastto-coast far the Caravan and was sa equipped as to give a camplete show under any and all lacal canditians.

Color Changes Due to Lighting

More accurate prediction of color appearance with changes from daylight to tungsten adaptation of the eye is possible with a set of equations recently developed at Eastman Kodak. Dr. Robert W. Burnham said the equations were the result of studies of the changes in color of many colored samples when viewed under daylight or tungsten light.

Dr. Burnham said that because of rigidly standardized viewing procedure, previously available mathematical data predicted much greater color differences due to lighting than are actually observed. In the normal process of measuring color, he explained, the subject is not allowed to adapt his eyes to the different varieties of light.

Great Advance Registered

Use of the new, empirical data has enabled Kodak scientists to formulate a set of equations that predict the apparent color change of the sample when the eye is allowed to adapt to both types of light.

In related research, scientists in England had performed color tests under the same conditions established at Kodak. Dr. Burnham and his associates, using the new equations, were able to predict the results of these tests with a good degree of accuracy.

The equations provide much needed data for the photographic industry. In the near future the researchers hope to formulate equations to predict color changes for fluorescent and other types of light.

OBITUARIES

AITCHESON, CHARLES, veteran member of Toronto Local 173, died of a cerebral hemorrhage on June 14. He was a member of the Local for 42 years. His wife survives him.

RYDER, ROBERT A., 54, member of St. Louis Local 143, died last month following a heart attack suffered while on his way to visit his ailing mother. He is survived by his mother, wife, and two daughters.

CUTHERBERTSON, NORMAN, 62, member of Toronto Local 173 for the past 26 years, died after a lingering illness. He was also a former member of Toronto Stagehands Local 58.

YEAGER, EUGENE C., 72, member of Local 143, St. Louis and former projectionist at the Gravois Theatre there, died recently following a long illness. Survivors are his wife, a son, and two daughters.

VIVIRITO, GEORGE ANTHONY, 75, charter member of Local 293, New Orleans, La., died recently.



A Prophecy We Wish Had Not Come True

Number TWO in a Series of Recollections of What Might Have Been

Those who play roulette often wait with what the literati term "bated breath" for the little ball to drop into its, for them, proper slot. Reading that pre-eminent showbusiness publication, Variety, some weeks ago we ran across the following:

Prophets Get the Usual Honors
1938 Volume, 'Television: A Struggle for
Power,' Foresaw Whole Pattern of Convulsions

These things were told about in a book, written in 1937 and published in 1938, by Joseph Borkin,

then an economist for the U.S. Dept. of Justice, and Frank Waldrop, then managing editor of the defunct "Washington Times Herald." Borkin is now an economist, attorney and publicist, practicing in Washington; while Waldrop is in business.

The little ball fell into its slot; and moved by that alchemy which prompts editors to yell "I told you so," we backtracked to IP of TWENTY YEARS AGO! and came up with the appended article from our October, 1938, issue. This chapter from the book (William Morrow Co., New York) was appropriately headed "The Somnolent Cinema:"

Television: A Struggle for Power

By FRANK WALDROP and JOSEPH BORKIN

IP: 20 Years Ago!

TELEVISION eats up large areas of the spectrum to the starvation of other radio services, but that is not the end of its ravening. It threatens to swallow whole industries. Radio set manufacturers will have to transform their technique production so that they may become TV set manufacturers. Radio broadcasters must become TV broadcasters.

The radio set manufacturers and the broadcasters who found the commercial band of the spectrum a vein of virgin gold, have recognized full well the danger that confronts them. In regiment formation they have bombarded the Federal Communications Commission to consider their interests as TV approaches. They experiment, make treaties among themselves, and offer plans for protection. They might be called sprinters, crouched for the starting gun in a race that will end in fame and fortune for somebody.

The Unwilling Fat Boy

But among the contestants we see an unwilling fat boy trying to assume the angular position of the ostrich with head in sand. That, in a word, is the way the motion picture industry is behaving as TV comes.

The bulk of TV programs will probably be in the form of motion picture films. For one thing, films are more easily televised than stage performances, and have proved so successful

that in the present experimental period 60% of the broadcasts are from films. Apart from mechanical perfection, there are other considerations. The film story technique lends itself naturally to TV; and so does the scenic perfection that the motion picture industry has developed.

Movie Industry Unpreparedness

But TV has a voracious appetite for material. If it comes to operate on a time schedule equal to that of present commercial radio, the present annual production schedule of films will not maintain service for more than three months.

To keep up with such a pace the movies will have to undergo radical changes. Present production schedules, if quadrupled, still would not meet the demand. But even if the supply of entertainment can be kept up, the movies still may be reduced to a minor vestigial program service unless a sound bargaining; position is established for them.

Having undergone one radical change in ownership and financial structure because of unpreparedness, the movie moguls ought by now to be alert to technical change and its threats, but, alas, they seem not to be.

At present the motion picture industry is in two distinct though not entirely separate branches, each dependent upon the other. One branch is concerned with the production and dis-

tribution of pictures (Hollywood), the other with exhibition (America). Hollywood concerns itself with studio operation, photography, sound recording, the selection of artists and plots; in a word, with picture creation. Production could go on in a TV era, only speeded up or slowed down to meet the demand; and nobody outside Hollywood, except those holding stock in movie companies, would know or care.

IP: 20 Years Ago!

The exhibitors simply put the finished products before America today and try to ward off the headache which is surely going to overtake them with the advent of TV. It would appear as though, when the new consumers are available at the studios, the producers may be in a measure freed from their dependence upon the exhibitor to whom they have had to cater for so many years; but actually the TV broadcaster is merely substituted for the exhibitor.

The movie moguls have always been the victims of a mania for, and a complete failure to attain, independence. Before the advent of sound pictures they used their fresh and copious profits to create exhibition outlets of their own wherever possible. Some of these remain today.

One of the first ventures into both sides of the market was made by William Fox, a furrier turned nickelodeon operator, who acquired a producing company to guarantee his theatres films for exhibition. Fox is a rare character and one of those who make this story possible, for he not only bound production and exhibition together, but overlaid both with sound and with banknotes.

At the advent of sound, Fox intensi-

fied the chain movement of theatres by pushing the industry into the new technique so that it had to be assured not only of actual distribution of product, but also of equipment in theatres to reproduce programs in a manner becoming the super-colossal empire that Hollywood conceived itself to be. On the practical side it was recognized that the movies could not go on half silent and half sound. Events and schemes pressed the moguls finally to choose sound.

The Crumbling Empire

The arrival of sound movies smashed the structrue of such leading companies as Fox, Universal, Paramount, and Radio-Keith-Orpheum, and made them the vassals of bankers. Famous actors and actresses became as obsolete as wooden plows or handmade shoes. Theatre orchestras vanished into picket lines; and the legitimate theatre became an appendage. Today, those few actors who refuse the Western adventure find themselves cast in productions which are conceived, designed, and maintained in the sole hope that some film company will take an option on them.

Is it inconceivable that the next step in the theatre's metamorphosis is a vestigial movie house in which to test public reaction before the great exhibition to the nation by way of the radio spectrum? Will the motion picture theatres occupy the present situation of the legitimate theatre?

To determine such questions as these the movie industry maintains an institution known as the Motion Picture Producers and Distributors of America. headed by Will Hays, who was Postmaster General of the United States during the administration of Warren G. Harding.

The 'Hush-Hush' Prall Report

In 1936 Mr. Hays hired A. Mortimer Prall to make a study of the relation of TV to the motion picture industry. Upon learning that this research student was the son of the late Anning Prall (who was then chairman of the Federal Communications Commission. which also had the problem of TV under study at that time) one recog-

1 "Broadcasting," June 15, 1937.

WANTED . . .

We are expanding and have an opening for an experienced IA Theatre Sound Engineer with a good technical background. Applications held in strictest confidence.

NORTHWEST SOUND SERVICE, INC. 73 Glenwood Ave., Minneapolis 3, Minn. nizes the astuteness of the "Czar of Hollywood."

Mr. Prall, in a highly confidential document entitled "Television Survey and Report," advised the movie people that TV opens a new and extremely important field for the industry. He pointed out that three times the amount of film they produced would be necessary for TV

In addition, "the motion picture industry is composed of great production corporations. They possess every element necessary to the production of the finest programs of sight and sound on film. Writers, composers, artists, designers, architects, engineers, technicians, construction men, studios, special equipment and the world's best actors and actresses are all part of this industry . . . It is clear that the motion picture industry is the only source of supply for television programs."

IP: 20 Years Ago!

Two plans were suggested in this report. One was that the present producers apply to the Federal Communications for permission to buy up one of the existing radio chains such as National Broadcasting, Columbia Broadcasting, or Mutual Broadcasting. The other was that the motion picture industry buy up stations not now in one





NATIONAL THEATRE SUPPLY COMPANY . BRANCHES COAST TO COAST

SOUND SYSTEMS

of the four major networks and form a fifth radio chain. That too necessitates application to the commission for license.

In other words, he suggested that the motion picture industry engage in the business of radio with the sanction of the commission of which his father was chairman.

There are several obvious faults in this plan. Sound radio is certainly a step towards TV. But it must be recalled that TV will play in the upper strata of the spectrum. There is, of course, no guarantee by Mr. A. Mortimer Prall that the Commission will give the movie industry frequencies for TV when the day for commercial exploitation arrives. It could happen that the movie industry would find itself left with two very large and moribund white elephants—the present motion picture studio and theatre system, and the sound radio system as well.

Is the exhibitor to be left to his fate by Mr. Prall? This is an important consideration, both for the producers and for the little men with neighborhood theatres. Because of their large investments in exhibition chains, it would be suicidal to their capital structure for the great producing systems to allow their theatre investments to crash.

But however we may pity them, we have to ask what incentives there will be for a customer to drive his car, run or even walk to a movie house when his own living room may become a theatre; and we can think of none that seems valid.

Maybe there are reasons why the movie palace will last despite TV. One argument has been advanced to the effect that the theatre will remain as a

of Consistent Quality and Outstanding Service For Every Theatre Need!

NATIONAL THEATRE SUPPLY COMPANY BRANCHES COAST-TO-COAST

place of assembly because man is naturally gregarious, but that possibility seems a poor comfort to the magnate whose fortune has to depend on it. Rather, he turns to a report of the Academy of Motion Picture Arts and Sciences which differs with Mr. Prall absolutely. It states that all is well and that the motion picture industry has nothing yet to worry about from TV.

"There appears no danger that television will burst unexpected on an unprepared motion picture industry," says the Academy; and since that is comfort from his own, the magnate dreams comfortably of apfelstrudel and dividends. Whether this is simply whistling in the dark, or is a private word of assurance based on evidence undisclosed to the public, is anybody's guess. . . ."

² Academy of Motion Picture Arts and Sciences, Report on Television, 1936.

ED.'s Note: The chapter goes on from this point to discuss the restrictive clauses in the original sound recording contracts, that is, "No licenses are herein granted or agreed for any of the following uses or purposes," and these purposes definitely covered TV in that they included specific reference to "a telephone, telegraph, or radio system"; also, "any apparatus operating by radio-frequency or carrier currents."

These recording contracts have since been modified, with results in the form of sales of motion pictures to TV networks all too apparent.

Legit Actors for Pay TV

The Council of Actors Equity, legitimate stage outfit affiliated with AFof L, has endorsed the principle of pay TV, practically alone among Labor groups. Reason given: "Pay TV can furnish... needed employment on all work levels, including new construction, engineering and other professions, in addition to the theatre crafts." Further, says A.E.:

"We hold that monopolistic controls should not dictate the trends of artistic expression or stifle creative production and that so long as advertising is the sole source of economic support for TV, the public will be forced to watch only that which advertisers deem it advantageous to show.

"Equity also believes that in addition to furthering the scope of employment for all performers, it will offer the viewer a freer choice in the best American tradition."

[IP is also for pay TV but for a different reason—its belief that pay TV will hurt all TV by turning people to other forms of entertainment, including the movie theatre.]

TOA Appeals SBA Decision

Theatre Owners of America have appealed the April decision of Small Business Administration denying loans to drive-in theatres. TOA cited the growth of drive-ins to their present 4500 number, the 50,000 people they employ directly, the \$51,000,000 capital investment they represent, their \$4,940,000 weekly boxoffice gross, and their \$1,976,000 weekly concessions gross, and their potential 30,000,000 per week capacity.

potential 30,000,000 per week capacity. These figures, says TOA, also indicate that many industries in the food and construction fields look to drive-in theatres for substantial income, and are further proof that drive-ins are of sufficient importance to make their prosperity a matter of public interest.

'Automatic' Film Printer

An Automatic Printer Light Selector has been developed by Unicorn Engineering Corp., of Hollywood for the Bell & Howell D and J printers. The automation consists of a programmed tape bearing light intensity change data, tape reader, computer for converting tape information into electrical impulses, and a servo-mechanism to activate the selector arm that positions the shutter aperture on the printing machine.

When printing film, various intensities of light are required to obtain desired print quality since, during the actual photography, different "scenes," each with its own particular exposure characteristic, are placed on a single



- BRIGHTER LIGHT
- LONGER BURNING
- SHARPER PICTURE

Free Test Samples



STEADIER LIGHTLESS ATTENTION

PERFECT COLOR BALANCE
Free Carbon Chart

N. Y. STATE PROJECTIONISTS ASSOC. MEETING IN BATAVIA



Group photo token of the recent N. Y. Stote Associotion of M. P. P. meeting in Botovio, N. Y. Left to right: Monford E. Pickerell, Eostern Theotre Supply, Buffolo; Edword Lochmon, president, Lorroine Corbons; Murroy Goldberg, Altec Service, Syrocuse; Henry O. Tober, Jr., business representative, Botovio Local 581; Geo. F. Roofloub, Association president and secretary of Syrocuse Local 376; Hermon Gobriel, secretary, Botovio Local; Donold M. Cole, Altec Service, Silver Springs, Md.; James J. Brennon, IATSE first vice-president; Nothoniel Dorogoff, Local 396, NYC; Jerry George, Notional Theotre Supply, Buffolo; H. Paul Shoy, 10th District secretary-treosurer; James C. Noughton, Notional Corbon Co. Seated at table: Charles F. Wheeler, secretary-treosurer of the Association.

length of negative. To compensate for this light variation (the differences in the amount of light recorded by the camera lens) and to assure balanced lighting for consecutive sequences (no excessive darkening or lightening of the final picture at the time of the scene change), adjustments are made in the amount of light emitted from the printer aperture.

The APLS does the job automatically, providing 30 different values of light intensity.

LaVezzi's L-50 Catalog

Marking its 50th year as a manufacturer of precision projection parts, La-Vezzi Machine Works, of Chicago has turned out a handsome and inclusive brochure of its product, keyed both as to number and price. This L-50 catalog of literally hundreds of 35-mm projector units covers the Regular and Super Simplex heads, the E-7 mechanism, and the Century C and CC assemblies.

Of special interest is the BB-66 intermittent movement assembly which enables the complete modernization of the Regular and Super Simplex. Details are given covering proper aperture plates for all picture ratios now in use. Film traps, complete gear trains, repair kits, a magoptical conversion kit are standout items in a list of parts which may be bought as individual units or as complete assemblies.

The L-50 catalog is a credit to the LaVezzi house and truly reflects the

fine work for which they are world-famous. The address: 4635 West Lake St., Chicago 44, Illinois.

Pay-TV in 3 Areas

International Telemeter Corp., owned by Paramount Pictures, announced plans to have three experimental pay-TV operations under way early next year. Company developed a coinbox-control system for attachment to TV sets to bring closed- circuit or over-the-air programs into the home.

Telemeter believes "that an effective pay-TV system must identify each program purchased by each subscriber, provide the means for varying prices depending on the attractiveness of the entertainment offer, and provide the viewer with complete freedom of choice as to the selection of his program."

Telemeter will not rely only upon movies in its experimental operations, but also will arrange to televise sports and other live-entertainment attractions.

New Tensilized 'Mylar' for Mag. Tape by Du Pont

A new type of thin gauge "Mylar" polyester film, with almost double the tensile strength of standard "Mylar", has been announced by Du Pont. The film is designed primarily for use hy the magnetic tape recording industry. All leading tape manufacturers plan use of the new type, known as 50 "Mylar" T, as a base for very thin tapes.

Increase Strength, Time Run

The increased yield strength, as well as tensile strength, offers improved performance for the so-called "double-play" tapes. These double-length tapes provide 2,400 feet of tape on a seven-inch reel—about twice the footage offered by tapes based on 1½-mil cellulose acetate or 1½-mil "Mylar". At a speed of 7½ inches per second, this represents two hours of playing time on a double-track recorder.

The increase in strength was accomplished without sacrifice of other important film properties. The new 50 "Mylar" T, like standard "Mylar", can be stored indefinitely. It is not affected by moisture and temperature extremes (from -80° to 300°F.) or subject to embrittlement. Initial price of the new film is \$4.50 per pound as compared with \$2.50 per pound for 50-gauge or half-mil, standard "Mylar".



SPROCKETS AND FILM PERFORATIONS

(Continued from page 8)

projectors having standard wide-tooth sprockets.

Even though optical prints escape the punishment inflicted on film by magnetic reproducers, the use of standard prints in projectors fitted with CinemaScope sprockets results in excessive checking, or cracking, at the corners of the sprocket holes. Print life is reduced to about 80% of normal, which corresponds almost exactly to the reduced width of the narrow sprocket teeth.

The increase in perforation check-

which the teeth must work.

Hooked, or undercut, sprocket teeth appear to be a characteristic of normal wear, but such teeth inflict great damage upon the perforations of the film. Since the teeth contact the perforations at the base, or thick part of the tooth, maximum wear occurs at this point. The tiny groove worn into the tooth has a pronounced tendency to "snag" the film and prevent its disengagement from the sprocket. The sprocket "sings" with a characteristic buzzing noise, and minute chips of

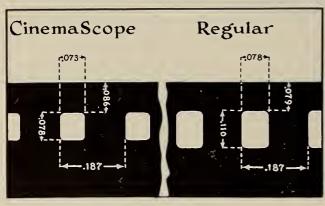


FIG. 3. The dimensions of regular positive and "Foxhole" CinemaScope film perforations contrasted.

ing caused by CinemaScope sprockets is especially prominent at the outer corners of the sprocket holes. Once started, small cracks quickly increase in length. If gate tension is excessive, the pull-down edges become cracked and chipped - a common cause of mild picture "jumping." Better projection is always obtained with regular sprockets; and since nearly all studios except 20th Century-Fox have returned to the use of straight optical-track release prints having standard perforations, regular sprockets should be used in theatres which do not play Fox pictures.

Wear of Sprocket Teeth

The projection process inevitably results in the wear of both the film perforations and the sprocket teeth. If the film be of good quality and the projector be properly adjusted for gate tension and idler-roller alignment, the print may last about 1,000 runs and the sprocket teeth remain in usable condition for more than a year. The teeth of the intermittent sprocket are the first to show signs of wear (if the other sprockets are not unduly soft) because of the acceleration characteristics of the intermittent movement and the tension of the film gate against

film are sometimes torn from the pulldown edges of the perforations.

A "singing" sprocket does not always indicate hooked teeth, as the lower holdback sprocket of W. E. universal bases "sings" even when new.

Excessive sprocket noise, however, calls for careful examination of the sprocket teeth.

A positive test for the detection of undercutting is provided by a sharp jack-knife blade, which is slowly passed up the film-contacting side of the sprocket tooth from its base to its tip. If the blade clicks audibly, a notch is present. Several of the teeth should be tested on each of the two rims of the sprocket, because small errors in the spacing of the teeth enables an occasional tooth to escape notching. The writer has discovered this incredibly poor condition in the upper feed sprockets made for one of the most widely used projectors.

The presence of undercutting demands that the affected sprocket be reversed (if the opposite side of the teeth are in new condition), or replaced at the very earliest moment.

REMEMBER: undercut feed, intermittent, and sound-sprocket teeth produce cracks in the pull-down edges of the perforations, or their corners, while worn holdback (takeup) sprocket teeth damage the opposite edge of the perforations. Feed-sprocket film damage is most apparent in the last 100 feet or so of a reel of film; while holdback-sprocket damage is most evident in the first 100 feet or so.

Avoid excessive upper-reel and takeup tension.

Westrex Corp. Sale to Litton Industries

Negotiations have been completed for the sale, on Aug. 15 next, of Westrex Corp. to Litton, Industries. of Beverly Hills, Calif. The pending sale complies with a provision of U. S. District Court of N. J. in case of U.S. vs. American Telephone & Telegraph Co. and its subsidiary, Western Electric Co., owner of Westrex. Sale price not announced; and Court must give final okay—which is expected.

Westrex organization of 1300 employees distributes and services in 35 offices abroad a line of communication products, including teletype and equipment for the motion picture industry. Domestically it engineers, distributes and services equipment for the film and phonograph record industries. Gross income in 1957 was \$13-million.

Litton, with 8500 employees, specializes in the manufacture of computers, data processing equipment, communications and navigation apparatus, business machines, microwave tubes, and electronic components, and has 17 domestic manufacturing and research operations,

and a plant in Amsterdam, Holland. It has a license from Paramount Pictures to manufacture the Chromatic TV tube. W. B. POTTER, long-time advertising director for the far-flung enterprises of Eastman Kodak Co. and directly responsible for many of the much-imitated innovations which today instantly characterize a "Kodak" ad, has been elected a member of the company's board of directors.

An alumnus of Dartmouth College, Potter joined Eastman in 1921 as a market analyst and progressed through various stages to one of the outstanding industrial - advertising personages in America.

Par. Still Eyeing Pay-TV

"The movie-industry's future, as I see it, is assured. . . . The first step is continuing to make spectacular 'block-buster' films for theatres, and, while this is going on, preparing for pay television . . . The next step is showing these films both in theatres and on pay television in order to reach a larger audience than ever before."—Barney Balaban, president, Paramount Pictures.

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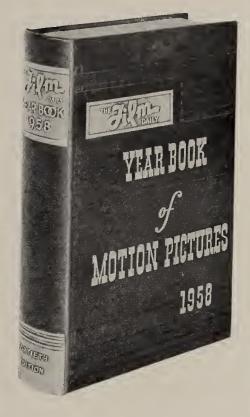
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Monthly Chat

'Focus-Drift' Problem Still Adrift

THERE was by no means a unanimity of acceptance accorded the article "Focus-Drift," by James J. Finn, which appeared in IP for June (p. 10, et seq.), with certain prominent projectionists holding tenaciously to the theory that difficulty in focusing the screen image is traceable directly to the acetate film base which, they hold, is inferior to nitrate stock.

This stand, alas, is based only on a "theory," there being available no definitely acceptable data, based on actual tests, to sustain this viewpoint—although it is generally admitted that the acetate base is softened by heat at a lower temperature than is nitrate. One might say that consideration of the relative "softening" of both types of film is akin to stalking a dead horse, since nitrate stock is no longer manufactured and we must utilize that which is available. Too ready acceptance of this view could be harmful, however, but it is quite possible that there are other factors which merit close examination—or, as one commentator expressed it, "the article . . . may lead to a fruitful line of investigation, namely, the possibility of an expansion of the projector mechanism under the influence of heat."

Attesting to the widespread interest in this topic, even outside projection circles, was the fact that the article was picked up and commented upon by other, non-technical journals. *Variety*, potent power in show business, was one such, and the following statement bearing on its comments perhaps will serve best here to set forth Mr. Finn's continuing adherence to his original contention:

Heat, not Film Base, the Culprit

"... It happens, however, that your brief summary mentioned only the projectionist postulate that triacetate (safety) film is the chief cause of this ... problem. This thesis is weighed ... in my article, wherein I stated definitely that the film factor alone is not rugged enough to carry the burden of the rap for this shortcoming:... the very same condition could, and undoubtedly would, prevail were the film base of nitrate—pre-1948 vintage.

"The devil operating to produce present conditions is many-horned, his anatomy being composed of the following elements (not necessarily in the order of importance but rather combinative): terrifically increased heat of the order of 50% resulting from improved light sources and more effective light at the film aperture; an increase of at least 15% in light-transmitting efficiency of the projector shutter; and the murderous effect of the higher heat level to disturb the balance of the 'faster' lenses which, of necessity, are at least 25% more sensitive to thermal 'shock' than were even their worthy immediate predecessors.

"In short, more *heat* produced at the arc and more efficiently transmitted to the projector aperture, where it impinges upon the film frame, is the real villain of the piece, irrespective of whether the film base be acetate or nitrate."

The foregoing view would seem to be substantiated by the findings resulting from the excellent intensive studies by Willy Borberg, of General Precision Equipment Corp., which have appeared in IP; also by the existence at Eastman Kodak of a high speed motion picture which shows precisely how heat "flaps" a film frame in and out at the aperture.

Actually, the matter boils down to a simple proposition: we clamored for more light through faster lenses for a vastly increased screen area. We got just that—and now we are being dunned for payment of the account.

WHAT CLICKS AT THE BOX OFFICE?



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INTERNATIONAL PROJECTIONIST

Volume 33 AUGUST 1958 Number 8

The Problem of Shutter Flicker

By ROBERT A. MITCHELL

Because the eye is one of the most sluggish muscles in the human body, we were permitted to develop the process of continuous viewing known as motion pictures. By dint of that ingenuity first perfected by the animal kingdom, great strides have been made in the suppression, not the eradication, of this troublesome factor in visual reproduction. Here is a summary of the what, the why and the how of this problem.

MOTION PICTURES and television both utilize a rapid succession of "still" images and the natural persistence of vision of the human eye to produce the illusion of a continuous moving picture. In neither system is the viewing screen continuously illuminated, for the nature of both TV and conventional film projection rerequires the presentation of "picture information" to the eye in an intermittent or piecemeal manner.

Direct film projection presents 24 separate still photographs, or frames, each second; television (in North America) presents 60 "scannings" in the form of 30 interlaced fields.

The standard motion-picture projector employs intermittent film transport through the projection gate with a rotating shutter to cut off the light and prevent projection of the vertically shifting photographic images during the short intervals when the film is in motion. Because there are 24 frame-by-frame pulldowns of the film each second, there must be at least 24 short periods of light-cutoff every second.

The human eye is such, however, that 24 interruptions in the screen illumination per second produce the effect of intolerably violent flicker. To minimize this annoyance, the standard projector shutter is designed to produce two light-cutoffs at every frame-shift, or intermittent cycle. The resulting cutoff frequency of 48 cycles per second eliminates flicker at low light levels, but unfortunately fails to remove it from the brighter areas of the projected scenes.

Shutter Cutoff Frequency

At normal light levels (10 to 20 foot-lamberts of screen brightness when the projector is run without film) the presence of flicker in such highlight areas of a picture as snow, clouds, white buildings, etc., is a visual discomfort.

Flicker is completely eliminated by the use of three, instead of two, lightcutoffs per intermittent cycle. This amounts to 72, instead of 48, cutoffs per second; and this high cutoff frequency is usually attained by substituting 3-blade shutters for the standard 2-blade shutters. A word of warning is in order, however, because conventional projectors having standard 3-to-1 geneva intermittent movements produce severe "travel-ghost" and even worse flicker with 3-blade shutters! Here is why:

A film-pulldown which occupies 1/4 of the total time of the intermittent cycle is too slow; and the flickering, streaky effect of travelghost results from light-cutoffs too brief to conceal the image during the entire time of film-pulldown from one frame to the next. Each blade of a normal 2-blade shutter cuts off the light for 1/96th second at standard film speed, but any one blade of a normal 3-blade shutter cuts off the light for only 1/144th second!

Projectors employing 5-to-1 movements which effect the pulldown in 1/6th of the intermittent cycle can utilize 3-blade shutters, and also 2-blade shutters having narrow blades for increased light transmission and brighter pictures. The pin-cross intermittent of the old Powers projector was a 5-to-1 movement, and so also

is the accelerated geneva ("Hi-Speed") intermittent of the modern Simplex X-L.

Transmission of Shutter

The shutter for a regular 3-to-1 intermittent must cut off the light during 1/4th of the intermittent cycle, or for $1/24 \times 1/4 = 1/96$ th second. Because a second cutoff of equal duration is necessary to increase the cutoff frequency to 48 cycles in order to reduce flicker, the total time of obscuration during one intermittent cycle is 2/96 = 1/48th second. This is exactly half the duration of the complete intermittent cycle (1/24th sec.), hence the motion-picture screen is actually pitch-dark 50% of the time!

The screen of a television set is dark for an even greater percentage of the total time; but unlike a projected motion picture, the successive frames of a TV picture are not presented in their entirety in successive "flashes." but are "scanned" by an intensely bright dot of light which travels across the screen from left to right in horizontal lines while more slowly moving down from top to bottom, where it completes its whirlwind journey.

The relationship between cutoff

the screen when the projector is run without film.

frequency, picture brightness, and the ratio of illumination to dark intervals is shown graphically in Fig. 1. The horizontal lines of the graph indicate cutoff frequency (cycles per second), and the vertical lines the highlight brightness of the picture (or, in the case of projected pictures, the brightness of the screen when blank light is projected with the shutter running, but with no film in the machine).

Flicker-Level Curves

The four curved lines indicate the levels of cutoff frequency and brightness at which the perception of flicker just begins to disappear from the middle of the field of vision when the cutoff frequency is *increased*, or just begins to become perceptible when the cutoff frequency is *decreased*.

The topmost curve supplies the flicker-perception data for nearly instantaneous flashes of light (TV picture tubes); while the three lower curves are for 2-blade projector shutters of different blade widths and light transmissions (33.3%, 50%, and 66.7%).

To ascertain whether or not flicker is perceptible under a specific set of conditions, locate on the graph a

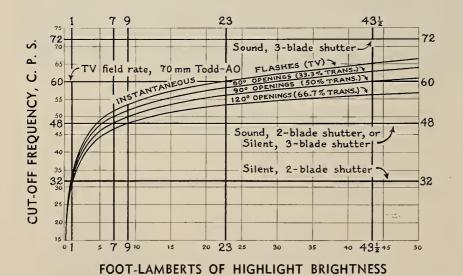


FIG. 1. Curves for the flicker-perception threshold for TV and 3 different projector shutters. The horizontal lines (vertical scale) indicate cutoff frequency, or periodicity, of the light flashes; while the vertical lines (horizontal scale) indicate the highlight brightnesses, or brightness of

If the curve for the shutter in use lies above the point located from the prevailing cutoff frequency and highlight brightness, then flicker is perceptible in the middle of the field of direct vision. Flicker is not perceptible only when the curve lies below the point so located.

point intersected by the proper cutoff-frequency and screen-brightness lines. If the curve for the shutter being used lies *above* the point so located, flicker is perceptible: if the curve lies *beneath*, then flicker is not perceptible.

A great deal of pertinent information can be obtained from Fig. 1. For example, a standard projector shutter of 50% transmission (3-to-1 intermittent) provides virtually flickerless pictures up to 7 foot-lamberts of screen brightness at 48 cycles per second. (The recommended minimum screen brightness is 9—10 foot-lamberts; and levels of 15—20 FL are definitely preferable.)

60° Shutters and Silent Films

A shutter of 66.7% transmission (5-to-1 intermittent) gives flickerless projection up to 9 foot-lamberts at 48 cycles per second. Such a shutter, if it be of the 2-blade type, has 60° blades and 120° openings. The Simplex X-L projector with "Hi-Speed" intermittent is fitted with a shutter having 65° blades and 115° openings (transmission 63.9%). This shutter tolerates up to about 8½ footlamberts of screen brightness at 48 cycles before flicker becomes evident.

It should be noted that a 3-blade shutter having 60° blades and 60° openings transmits 50% of the light just as a standard shutter does (and hence is represented by the same curve), but produces a cutoff frequency of 72 cycles. At this high frequency no flicker is visible at any light level!

TV Picture Scanning

The dot of light which illuminates the face of a TV picture tube is produced by a sharply focused beam of electrons, modulated in intensity by the video signal, and invisible until it impinges upon the fluorescent coating of the tube. This remarkable dot scans the entire screen once in 1/60th of a second, but during the following 1/60th second it scans between the lines of the first scanning! The process of "interlaced scanning" is then repeated—30 "interlaced fields" per second. Visually, however, this amounts to 60 light-cutoffs per second, a frequency so high that it is virtually flickerless.

The phosphors with which ordinary (Continued on page 21)





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The Geneva Intermittent Movement:

Its Construction and Action

IP has been for 27 years the repository of factual, not fanciful, projection data, as is attested by the appended excerpt from the IP archives, antedating by 20 years the introduction of the Simplex 5-to-1 intermittent movement (but by no means the Powers, upon which many of us in the projection field were weaned).

The fact is that the pin upon entering and leaving the star slots, should do so tangentially. Why? So that we may have a smooth and thus steady movement; otherwise movement breakage,

film tearing and wear, and unsteadiness may not only be expected but are inevitable.

It should be noted that the latest Simplex high-speed movement satisfies all the prerequisite conditions set down in the appended evaluation, because it does not obtain its increase in pull-down speed by the method shown in Fig. 3; it does it, rather, by means of a smooth-acting, old-time, 4-slot star and cam pin with a 90-degree engagement angle. It accomplishes this fast action solely by accelerated pin motion during this 90-degree engagement angle.—JAMES J. FINN.

THE Geneva intermittent movement is used in all modern theatre projectors; claw-type movements are used in studios for process work. The Geneva changes continuous rotary motion into an intermittent motion, the camshaft turning at a uniform speed, the while the intermittent sprocket stands still part of the time and moves very rapidly the rest of the time.

The intermittent must transport about 8 inches of film a distance of \(^3\)4-inch at an average speed 4 times normal, and stop each frame in exactly the same position at the aperture. This is one of the modern wonders of motion picture technology.

Slot Engagement in Pin

When moving at a uniform speed (as it does on the upper sprocket), each frame is in motion 4 times as long as it is when in motion at the aperture. The average speed at the aperture is 4 time normal, or 360 feet per minute. Due to inertia, the film, the sprocket, and the intermittent shaft must be brought up to this speed gradually,

PIN B

By A. C. SCHROEDER

Member, I. A. Local Union 150

Los Angeles, California

consequently the maximum speed must exceed 360.

Figure 1 shows the pin at the instant it engages the slot in the star: exactly one-half the pin is in the slot. Until this movement, the star has not moved. A represents cam center, and B the star center.

A, the center of the pin, and B form a right-angle, as is indicated by the dotted lines. The arrow indicates the direction of pin-travel for an infinitesimal fraction of time at the exact instant that it engages the slot. Notice that the pin-travel coincides with the direction of the slot: consequently, there still is no movement of the star.

Accelerating Speed of Star

This condition holds true for only an instant — immediately following which the star starts to move very slowly; but the acceleration constantly increases until the cam has turned 30 degrees. The speed of the star, and consequently that of the film, is still increasing, even after the 30-degree rotation of the cam; but the rate of acceleration has decreased.

Figure 2 shows the intermittent movement when the speed of the star is greatest — but acceleration has stopped. The pin is in line with the shaft centers, A and B, and is, comparatively, closer to B. For a brief

instant the pin and the sides of the slot act almost like gear teeth.

The radius of the corresponding large gear would be the distance from A to the pin center; the radius of the corresponding small gear being B to the center pin. Since the latter is much less than the former, the star is turning at the rate of many more revolutions per minute than is the cam.

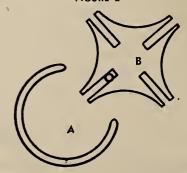
As the pin leaves the position shown in Fig. 2, the star, the sprocket, and the film begin to decelerate. This part of the cycle is equally important as is the first half.

Vital: Fit and Adjustment

If the separate parts fit properly (that old debil tolerance) and are adjusted so that operation of the first half-cycle is precise, the conditions will also be correct for the second half-cycle.

If the separate parts of the whole fit something less than precisely, the tension shoes must decelerate not only the film but also the star, its shaft, and the sprocket at least part of the time between that position shown in Fig. 2 and the completion of the film

FIGURE 2



transfer—thus putting an enormous load on the sprocket holes of the film at the end of its brief, but vital-time-period, transit and preventing proper positioning of the film at the end of its travel-span.

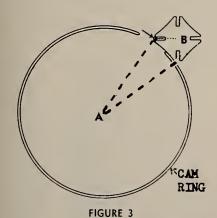
The star, its shaft, and the sprocket, having attained such a high speed at the 45-degree position shown in Fig. 2, tend to maintain that speed; but the cam pin *prevents* this and forces the star to gradually slow down.

Immediately following the posture shown in Fig. 2, the deceleration is low. Then the rate of deceleration increases (remember that the pin is decelerating the star all through this time period). The rate of deceleration decreases toward the end of this time-phase—the star is almost stationary when the pin is about to leave the slot

Perfect Positioning-or Else

The lock ring (see C in Fig. 1) contacts the curved portion of the star snugly, thus holding it in, we hope, a rigid position while the film image is projected onto the screen. The end of the lock ring is approximately at a line A-B when the pin enters the slot. When the end of the ring is above this line, the star cannot move in either direction. As the pin proceeds farther into the slot, the end of the cam ring moves down and away from this line and thus permits the star to turn, as shown in Fig. 2.

If the lock ring extends beyond the aforementioned dotted line as the pin enters the slot, the star still is *locked*, while the pin exerts pressure on the star in an attempt to turn it—thus the movement will not work. If the lock ring does *not* extend to the dotted line



Notice that the radius on sides of this star is much greater than in Figs. 1 and 2; also, slots are not so deep, due to large cam and the larger circle in which pin travels.

Projectionist License Exam Questions

EVEN the most competent projectionists working daily at the craft and applying a knowledge gained through the years which might be termed ingrained are benefited by an occasional mental review of certain facts relative to the art. The appended questions will serve this purpose. A mark of 75 is considered a passing grade.

1. The pictures on the screen appear to be continuous because:

(a) the pictures are continuous; (b) the eye makes them seem to be continuous; (c) if the pictures on the screen are intermittent, they blend into one another successively; (d) if the pictures on the screen are *not* intermittent, they blend into one another successively.

2. Cellulose nitrate motion picture film is:

(a) slow-burning; (b) highly inflammable; (c) non-inflammable; (d) non-poisonous.

3. All openings in the projection room shall be equipped with:

(a) plain-glass windows; (b) wire-glass windows; (c) approved fire-resistant doors or shutters.

4. Film cleaning fluid generally used is:
(a) collodion or acetone; (b) cellulose acetate; (c) cellulose nitrate;
(d) carbon tetrachloride.

5. Splicing fluid generally used is:

(a) collodion or acetone; (b) cellulose acetate; (c) cellulose nitrate; (d) carbon tetrachloride. [Note: Butt splicing is modern practice.]

6. Electric current is measured by:

(a) a voltmeter; (b) an ameter; (c) a wattmeter; (d) a footage meter.

7. Most of the light in a DC arglamn

7. Most of the light in a DC arclamp comes from:
(a) the negative tip; (b) the positive

when the nin is in the position shown

when the pin is in the position shown in Fig. 1, the star is free to turn before the pin enters the slot, with the result that the pin might strike the point of the star and thus wreck (strip) the movement.

Consider now the possibilities inherent in a faster intermittent movement. (See "Film Frame Exposure Time" in IP for April last, p. 18.) In the ordinary movement the cam and the pin turn through 90 degrees while the star and sprocket move the film one frame. To increase the speed of the movement we must allow less than 90 degrees of cam rotation to complete the movement of the star. The pin still enters and leaves the slot at the same two points, and to do this in less than 90 degrees the cam center must be farther away, thus decreasing the angle A as shown by the dotted lines

The corresponding angle shown in

crater; (c) the sides of the negative tip; (d) the edge of the positive crater. 3. Regulation of current through a DC arclamp is performed by:

(a) a voltmeter; (b) an ammeter; (c) a wattmeter; (d) a rheostat.

9. Negative carbons often have cores of

The reduce the electrical resistance

(a) to reduce the electrical resistance and hence the cost of burning; (b) to burn at a higher temperature; (c) to keep the light more uniform; (d) to reduce the cost of manufacture.

10. The purpose of an amplifier is:

(a) to increase the voltage supplied to the arc; (b) to control the speed of the projector; (c) to increase the power of the sound current coming from the photocell; (d) to control the arc-feed.

11. The purpose of the fader during changeover is:

(a) to cause the sound to fade out and then fade in, as one changes from one machine to the other; (b) to cause the picture to fadeout and then fadein as one changes from one machine to the other; (c) to cause one machine to start and the other to stop; (d) to switch the sound suddenly from one machine to the other so that the nussic or the words being spoken by the actors blend.

12. How does the rectifier furnish a constant (steady) or direct current to an amplifier? The pulsating current is:

(a) smoothed out into steady current by an electrical filter consisting of cells and condensers; (b) converted into direct current by a motor-generator; (c) transformed into direct current by a transformer; (d) rectified again by another rectifier.

[ANSWERS ON PAGE 17]

Fig. 1 is 90 degrees. Notice how much smaller is this angle than in Fig. 3. The arrow in Fig. 3 shows the direction of the pin travel as it enters the slot: notice particularly that it does not correspond to the direction of the slot as it does in Fig. 1. Result: the pin contacts the slot with a bang! and the star immediately turns at a certain finite speed—a miniature collision occurs and the shock is transmitted to the film.

This extremely rough treatment soon is manifest not only on the film but on all the parts of the intermittent, including the cam pin. The larger the cam, with the same size star, the harder is the impact. If both the cam and the star are larger, in proportion, there is no increase in speed, although the several parts are more able to stand the strain imposed upon them.

[TO BE CONTINUED]

Projection CLINIC

Film Scratches, Grain; Arc "Adjustment"

SOMETIME AGO while visiting a friend in a Tv studio I noticed that they were picking up the movie film by some sort of a clear glass. I figured that the reason they were doing this was to get rid of the scratches and graininess in the film, thus imparting a "new" look to the print. I wonder why we could not make use of this "stunt" in the theatre.

Also, on the wide screen I focus the picture 1/3 in from either side, depending upon the greater heat density to "swing" the center of the image into focus with the sides. Of course, some readjustment of the arc is necessary. -THOMAS W. RICH, Corpus Christie, Texas.

COMMENT: The optical flats, or mirrors. in the TV studio for the film pickup are part of the optical multiplexer which enables the film projectors and a slide projector to focus their images upon a single vidicon camera tube. The object is one of economy and convenience and, of course, has no effect upon film scratches and graininess.

In fact, there is no effective way of dealing with these defects of film without eliminating the picture itself. Only in the case of scratches on the base side of the film do optical effects play a part; and here the best solution to the problem is a "fast" lamp which somewhat approximates the conditions of "diffuse" illumination.

As for "readjustment of the arc," it is not clear just what is meant by this term. Maybe the lenses are faulty. It would seem that no such "adjustment" is permissible. In any case, the amount of heat varies with the light, and in the same proportion.

Arc Adjustment and Focus

The old hi-lo lamp was exceedingly sensitive as regards arc focus, and permitted an alternation of the direction of the rays passing through the aperture in a way that immediately revealed the slightest out-of-focus adjustment of the projection lens. Furthermore, the essentially parallel direction of the rays from this lamp showed up rather prominently scratches on the base side of the film.

Each scratch functions as a tiny cylindrical lens-a function that is somewhat masked by modern lamps with large mirrors. Large mirrors involve larger angular differences in the direction of the rays through the aperture, as can be demonstrated by drawing an imaginary

line from the outer edge of the mirror to a point on the opposite side of the film aperture, and thence forward to the projection lens.

Panavision Brightness Meter Tops Modern Units

PRIMARY FUNCTION of the Panavision Brightness Meter* is the measurement of brightness as expressed in foot-lamberts, but by simply plugging in a photoelectric attachment available for the meter, incident light may be measured directly in foot-candles-the basic essentail for "reading" motion picture screens.

Accurate overall measurement covers four factors: screen brightness. light distribution side-to-center, brightness as seen from a side seat or balcony seat, and determination of screen "gain",

Outstanding features of the Panavision Meter: it is of the "visual comparison" type, with the field colormatched to provide accurate readings regardless of experience; no warm-up period necessary—readings can be made immediately; no "zero balancing" required, as it is continuously ready for use; operating independent of battery age, using only a single 11/2-volt standard flashlight battery which operates lamp at half voltage for long life; the meter has "memory" in that it will always return to its last previous reading when the switch is closed.

Also: direct reading in foot-lamberts from 0 to 30, with use of adapters ex-

* Licensed by Motion Picture Research Council.



The Panavision Brightness Meter

tending range to 3000 foot-lamberts; microswitch operation requiring only the touch of a finger, with gold contacts assuring trouble-free operation and long life; tripod socket in meter case can be left permanently mounted.

Also: microammeter automatically short-circuited when not in use; colorcorrected for wide range of color temperature, from incandescent to carbon arc to daylight; scale is spread at low end, facilitating reading of low light levels such as drive-in screens.

Further details available from Panavision, Inc., 1917 Pontius Ave., Los Angeles, Calif., including 10-page pocket-size illustrated folder.

16-mm Unit Construction

In a recent press release anent the new Miracle 16-mm projector there appear two statements which would seem to require some comment. It is stated, for one, that geneva movements are "usual" in 16-mm units. Now, geneva movements are sprocket movements, and these have always been used in the better 16-mm projectors. But "drunkcam" movements are better for this application because the former avoid reduction gearing between the starwheel and the sprocket.

A 16-mm projector should have at least 8 teeth on the sprocket; and with the conventional straight geneva movement the intermittent sprocket would have only 4 teeth.

The second Miracle statement that their film gate construction has "continuous" film rails to prevent emulsion deposits merely reflects a commonplace of the art, because the vast majority of such projectors have an identical construction. RCA, Victor, DeVry and Bell & Howell, to mention a few, have been doing just this for years.

Tight Carbon-Holder Grip

IF CARBONS are not gripped tightly by their holders the higher transfer resistance will cause scorched spots on the carbon holders, which will increase steadily and finally render them completely useless. The carbons must be thoroughly gripped tightly at all times.

BEARING REHABILITATION of the right kind can put 62% of used anti-friction bearings back into service, according to Cort L. Miller, founder of Eastman Kodak's bearing test center. Kodak's method: clean bearings in solvent bath; remove dirt with ultrasonic vapor de-greaser; test for physical dimensions such as radial clearance, bore, outside diameter; mount on spindle and rotate under load; with vibration meter or acclerometer, get numerical value to determine record of bearing's quality.

Anatomy of a Fresnel Lens

A (Fig. 1) is thick and heavy, and because it requires a large weight of very clear glass, it is expensive. The focal length of a condenser is short in comparison with its diameter, which should be as large as possible. Two or more condensers are used together for a resultant focal length much shorter than is possible to obtain with a single lens.

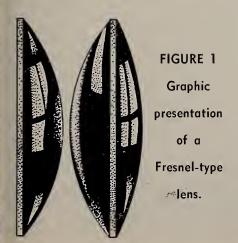
The thickness of a large condensing lens increases the likelihood of cracking when subjected to extremes of temperature. A cracked condenser is a calamity because of the high cost of replacement. Arclamp condensers are thus often left in service even after they have become severely chipped and cracked.

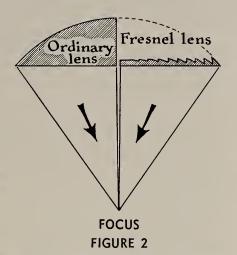
The French physicist Augustin Jean Fresnel (pronounced fray-NELL) discovered more than 150 years ago how to "compress" a large, thick lens into the form of a thin plate embossed with circular ridges of prismatic form. Fig. 2 shows a Fresnel lens with cross-section to illustrate how each of the concentric rings assumes the form of a tiny portion of a regular lens.

H-I Arclamp Application

Fresnel lenses are extensively used in signal lights, searchlights, and spotlights. They are also suitable for motion-picture illumination systems, an application of special value for portable projectors employing incandescent lamps. It may be noted that most arc lamphouses utilized condensers instead of mirrors in the early days of motion pictures; and even at the present time condensing lenses are required for such high-powered projection arclamps as the Peerless Hi-Candescent and the Brenkert Supertensity. The use of Fresnel lenses in this type of lamp immediately suggests itself.

Sheets of transparent plastic embossed





with a fine Fresnel pattern of concentric stepped zones have found extensive application as screens for small rear projectors (slide viewers, film editors, etc.) and for reflex and plate-back cameras. The use of Fresnel screens in place of ground-glass plates results in brighter, more evenly illuminated images.

The Psychology of Color by Kodak Scientist

The eye is the most remarkable color camera in existence, according to Dr. Sidney M. Newhall of Eastman Kodak Color Technology Division. It automatically aims and focuses in $\frac{1}{2}$ second, while aperture adjustment takes even less time. The speed of the eye-camera with maximum pupil is about $\frac{f}{2}$. The full color "film" is stereoscopic and self-renewing after every exposure, with "development" time only a fraction of a sec-

ond, he said, in discussing the complicated mechanism by which we perceive color.

The psychological experience of seeing color has four stages, he said. The first stage in seeing color, Dr. Newhall explained, is the color stimulus occurring outside the eye. The physiological activity of the eye that results from this stimulus provides a second stage.

Vital: 'Perceptual Response'

Most important is the third stage, perceptual response, when we consciously perceive the color. This stage has been the subject of study at Kodak to determine what psychological factors govern our response to color. Secondary effects such as emotional response, or attention and memory effects make up the final stage. It was stressed that several of these stages may occur simultaneously.

Studies of the fourth stage effects have yielded some interesting results. It has been shown by psychological studies that color is a definite aid to memory. It was also pointed out that emotional response is very keen to colors that conflict with our established conceptions of what color should be. Thus few people would enjoy drinking blue tomato juice or eating pink celery.

Dr. Newhall's paper was presented before a summer session at Massachusetts Institute of Technology.

STILL SMALLER, simpler circuits appear closer through work on new class of ultra-miniature, integrated electronic devices at RCA. Unit now being developed, a shift-register transistor, is ½ inch long, 4/1,000-inch thick. With further work, it is expected to perform functions of 20 transistors, 40 resistors, or 20 capacitors.

The What, Why and How of Frequency Modulation

FREQUENCY MODULATION (FM)—A method of radio broadcasting in which the broadcast waves change in *length* and their *strength* remains constant.

AMPLITUDE MODULATION (AM)—The present standard method of broadcasting, in which the broadcast waves *change* in strength but the wave-length remains *unchanged*.

WHAT FM DOES—Eliminates static, noise of electrical appliances and other disturbances that interfere with reception on AM radio receivers. It also permits reception of the entire range of sound *audible* to the human ear.

WHERE FM OPERATES—The Federal Communications Commission has assigned FM broadcasting to the extremely short wave-lengths. (Because electricity travels at a uniform speed of 186,000 miles a second, a short wave-length means that a large number of waves occur each second, hence they have a high frequency. Frequency is expressed in cycles. One thousand cycles are called a kilocycle, one million cycles a megacycle.) Each FM station is allowed a channel 200,000 cycles wide, compared with the 10,000-cycle channels of standard broadcasting.

RANGE—High-frequency radio signals have some of the characteristics of light, and like light are unable to follow the curvature of the earth. As a result, FM signals generally cannot be heard more than 100 miles from the broadcasting station. Television stations are similarly limited in range because they also broadcast in the higher frequencies.



Date or mate

...They're today's best box-office bet

More than thirty million young adults like these go to the movies each week, seeking entertainment and escape!
Romance, adventure, mystery, drama—they like 'em all. But the fact—the big outstanding fact—is that the better the picture, the more they go, AND THE BIGGER THE BOX OFFICE!

Help on technical aspects of making motion pictures better—producing, processing, and projection—is available from the Eastman Technical Service for Motion Picture Film. This is a useful service since technical excellence contributes so much toward maintaining the sense of illusion which characterizes all fine pictures. Offices at strategic centers. Inquiries invited.

Motion Picture Film Department
EASTMAN KODAK COMPANY
Rochester 4, N.Y.

East Coast Division 342 Madison Avenue New York 17, New York

Midwest Division 130 East Randolph Drive Chicago 1, III.

West Coast Division 6706 Santa Monica Blvd. Hollywood 38, Calif.



In the SPOTLIGHT

Fifty years ago, plus a few months (March 11, 1908) there was issued the first purely projectionist charter by the "National" Alliance of Theatrical Stage Employees. Here in capsule form is a record of organizational development since then.

50th Anniversary of IA 'Operators'

COINCIDENT with the current 44th Convention of the IATSE at St. Louis is the anniversary, a few months delayed. of the chartering of the first autonomous Local Union (No. 143, sic) of the projectionists within the IA. The stagehands, of course, provided the nucleus of the parent organization, and despite the upsurge of sound motion pictures in the 1920's and the corresponding decline in the fortunes of stagehands, they have maintained their ascendency in terms of IA influence to this day.

This is all the more amazing in the light of progress which embraced the application of electronic techniques to both the studio and theatre ends of the motion picture process.

The St. Louis affiliation with the IA was formalized on March 11, 1908, with the issuance of a charter by the IA to the "Electric Picture and Projection Machine Operators Branch No. 3." signed by John Suarez, General President, and Lee M. Hart, Secretary-Treasurer. Four months later, on July 16, 1908, the IA issued a second charter, signed by President John J. Barry, designating the Local as No. 143.

A Half-Century Later

Two charter members still are with the present Local 143: George O'Rafferty and A. P. Petill. Local 143 also has eight 50-year members: M. L. Anderson, Sr.; Charles Serkes, Clay Tabler, John Kahl, Fremont Noertemann, Joe Schrempp, Roscoe C. Hawkins, and William F. Canavan, the latter destined to be International President at the time of its most conspicuous growth in prestige and authority in an era marked by the introduction of sound pictures and, perhaps of the utmost significance, the Unionization of the West Coast studios—from which stemmed future IA organ-

izing leverage and the formation of a truly vertical Union.

The term "Electric" in the first charter to "Branch 3" of St. Louis is indicative of the narrow margin by which projectionists missed being affiliated with the IBEW, which for 35 years thereafter never failed to assert and actively campaign for the inclusion of projectionists within its membership. Significantly, two 50-year members of Local 143—Messrs. O'Rafferty and Canavan—are at work with that most modern of sound-picture processes, Cinerama, at the Ambassador theatre in St. Louis.

Culled from the files of St. Louis Local 143 is the following commentary on the times incident to its first chartering: "As they were leaving the installation meeting, some members asked 'How about wages?' The answer was: 'Try to get \$12 a week'—the wage at that time being

Reproduction of the

first page of the pro-

ceedings of First An-

nual Convention of the

National Alliance of

Theatrical Stage Em-

ployes (now the IA)

which was held in Elks

Hall, N. Y. City, July

17-19, 1893, Delegates

numbered 16.

\$10 per week for 77 hours! Some men worked from 9 A.M. to 11 P.M. cranking the machine by hand all through this period.

"At the time of the founding of 'Branch' No. 3, the 'booths' had no toilets or water. The 'operators' carried the film to and from the job at 25 cents per change of program. The stagehands gave a lot of help to this young Local by giving the men jobs as spotlight operators at \$9 per week.

"From the first, we were running a slide which read, 'Union Operator No. 1 Employed Here, Moving Picture Operators Union Branch No. 3 of I.A.T.S.E., affiliated with A. F. L.' The original slide No. 1, given to our first president, is in our files. It was handpainted."

Such were the beginnings. In the ensuing 50 years of projectionist affiliation with the IA there occurred a bewildering, kaleidoscopic series of events which, impinging upon a less dedicated group of men devoted to a common purpose, would have signalized its extinction as an organization.

Those pioneers who fought so hard for so long for, first, the establishment, then the recognition. and, finally, the preservation of the IA as an entity, may not, cannot be slighted in this brief summary of progress.

By this is not meant only the stolid endurance of actual physical pain as a result of brickbats (in many forms, solid or otherwise) but also those aches of mind which were the product, for them and their families, of derision and humiliation.

It must be emphasized that those who went through the transistory phase of

ORGANIZING MEETING OF 'NATIONAL' ALLIANCE 65 YEARS AGO

SECRETARY'S REPGRT OF THE PROCEEDINGS.

New York, July 17th, 18s

Meeting celled to order 11.35 A. M., John Qallegber of

rgb in the chair. Grdered on motion that Brother Morohead o

in a lat as secretary interest on motive data rendered and rendered appropriate that provides the provides of the half to not sport for the visiting members of the Order, Srother McGowen of the N. Y. U. P. appulated sergeant-at-arms, Ordered on motion that a committee he oppointed to examine the credentials. Brothers Kelly of Now York, DePuy of Deaver and literary of Drooklys appointed.

REPORT OF COMMITTEE ON CREDENTIALS.

The Committee on Credential respectfully report that the bare examined the credentials of the following annal brothers then by their reappearties locals as representatives and find them correspond to the control of t

Respectfully aubmitted,

PHILIP KELLY,

F. H. DePUY,

HENRY H, HARVEY,

Grderod on motion to adjourn to 1.50 P. M.
Meeting celled to order 1.50 P. M. Roll call and minutes
morping scalon read and edopted.
Grdored on motion that we go into nomination and election

John O. Williams of New York, Lee M. Hart of Chicago an John Gallaghor of Pittabreth nominated for President. Thomas Murray of Philadolphia, F. H. DePay of Denver an Alexander Pranamuller of 8t, Louis nominated for Vicepresident. John Gallagher of Pittaburgh and George W. Glenny of Chicag Sominated for Recording. Secretary.

of Denver nominated for Trossurer.

James Gillespie of Buffalo, Percy Farron of Philadelphie and Aloxandor Franzmullor of St. Louis nominated for Board of Trustees.

Greered on motion to go into election of officers and elefer the election of the Law and Girorance Committee until the election of

election of the Law and Griovance Committee until the election the other officers.

Judge and tellors appointed by the chair to supervise the eltion, Brothers McCarron, Hart and Gilleaple, who report the f

For President.

First ballot decisred void on account of informality. Droth Lee M Hart withdrew.

Ordered on motion that the nominee receiving highest number of votes declared elected.

At this state of the meeting an invitation was received from Mr J E. Marsels of the Devoit Hopper Opper Company to visit the performance on the evening July 18th, 1898, which was accepted with a vote of thrake of the convention.

For President Whole number of voice coat John G. Williams John Gallagher

John Gallagher

ther Williams declared elected.

ction declared unanimous on motion of Brother Gallagher,

mas Murray for Vice-president, vote declared nasaimous.

Gallagher for Recording Secretary, vots made unsaimous.

James Officepie, Perry Farron and Alexander Franqueller for Gridered on moliton that the new elected officers take their resective positions. On the production of the properties of the ordered on motion that we go into commission and election of the production of the production of the production of F. H. DePoy of Deniver, G. W. Glesony of Chiego, F. E. Norton Syrreccies, James E. Walker of Brootkur, John Gallagher of Parts.

The judges and tellors appointed report the following: Norton 10, Gellaghor 14, DePuy 11. Glomy 14, Walker 4, Frannuller 7, Gallagher, Glomp, DePuy and Norton declared elected. Ordered on motion that the Law and Grievance Committee draft

Meeting called to order \$ o'clock Roll call; all delegates cents. President Williams in the A.M. Roll call; all delegates cents. President Williams in the A.M. Roll call; all delegates order delegates with the regular order of sinces and take a recess of one hour to allow the Law and Grier-Meeting college to order at 10:40 A.M. Heeting college to order at 10:40 A.M.

Meeting called to order at 10:40 A. M.
Ordered on motion that a committee be appointed to interview
the committee of the committee of the prevence under
the Brother Franzmüller of St. Louis
Brothers Kelly or New York and Barry of Boston appointed on
Ordered on motion that all intermation to reporters regarding
Credentials of Brothers Cal Kelly of Calingst Treedyed and reCredentials of Brother Cal Kelly of Calingst Treedyed and re-

ferred to Committee on Credentials report Brother Kelly of Clocinas committee on Credentials report Brother Kelly of Clocinas entitled to a seet in the convoction. Adjournment 22 o'clock to meet 1 P. M.

Richard of the Law and Grievance Committee on Constitution as mylacewed on motion that the Secretary read the Spi-Laws and Constitution through once.

Gradered on motion that the Secretary read the Spi-Laws and Constitution and viole be taken on each section subject to change after the constitution and viole be taken on each section subject to change after the constitution and viole be taken on each section subject to change after the constitution and viole to take the words "Law and Grievance Committee Committ

Griered on motion that the words "Law and Grievance Commitor Grieved on motion that all moneys of this Alliance be deposited in the City of New Tork. Grieved on motion that the Pinancial Secretary turnish bonds to Grieved on motion that the Financial Secretary turnish bonds to Grieved on motion that the Treasurer Furnish bonds to the smount of \$1000. Trustees, \$500.

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Brothers Ed Kully of Cincinnati and P. Barry of Boston noss

Structure of the IATSE By GENE ATKINSON

38th IA CONVENTION, JULY 1946

To you of the living stage, the founders and protectors of our Alliance down through the years, who through superb stagecraft provide within the area of three bare walls a fitting background for drama and laughter, music and color;

you from the production studios whose myriad collective efforts, by some strange alchemy succeed in imprisoning on film the cumulative contributions of many minds, many hearts and many hands;

you who rove through city and town, highway and byway, in the air, on and below the sea, and in the bowels of the earth in every sector of the globe, to capture by the magic of your camera those contemporary events which are history in the making; you whose unceasing vigilance in film-distribution centers insures the safe transit of a precious cargo;

you in thousands of projection rooms who daily bring to fruition the sum total of industry effort by utilizing expertly a narrow ribbon of film to effect delivery of the finished product to the public;

you whose inclusive knowledge and precise calculations effect the proper installation and uninterrupted smooth operation of delicately-wrought and finely-machined equipments; and,

you most recent additions to our Alliance whose efforts are directed toward flinging into the ether a complex pattern of sound and picture which will provide additional entertainment for uncounted millions—

to all you practitioners of a living, vibrant art that serves to lend a deeper meaning and added breadth to life, we bid you welcome . . .

clandestine meetings, secret organization, and then aggressive "requests" for recognition, were the real builders who bridged the gap between worker and technician. This includes in fulsome measure our craft brothers, the cameramen, who take the first irrevocable step in the production of a motion picture.

Moral: If it isn't on the film, it cannot be shown on the screen.

IP's library is probably the most comprehensive extant in terms of historical data relative to the IA. From the very first organizing meeting in 1893 down to the day these words were written, there is on hand at IP an official record of every word included in the Official Proceedings since 1893.

On the occasion of this 50th Anniversary of the affiliation of the first projectionist organization with the IA, there is presented elsewhere in this summary a reproduction of the first page in the first official summary of an IA proceeding—the organizing session in 1893. Food for reflection is the entry for \$1.50 as a "legitimate" expense item, approved by the delegates; 1958 seems so remote, almost in terms of light years now that we are "shooting" for the moon.

'National' to 'International'

Oddly, on page 139 of the 10th Annual Convention Proceedings there appears a statement by Lee M. Hart, General Secretary-Treasurer, bearing on the "necessity" for changing the "name and charter" of the "National" Alliance of Theatrical Stage Employees to that of "International," anticipated future growth being the reason advanced.

But the very Proceedings which recounted the authorized application for a change in title are headed "International," and nowhere in subsequent Proceedings is there any reference to either the application to or the approval by the American Federation of Labor for such a change in the original wording of the charter. The 10th Convention met in July at Emerald Hall, Norfolk, Va.

And Then—the 'Operators'

It was not until the Official Proceedings for the 22nd Convention (held at Arcadia Hall in Chicago in July, 1915) were printed that the IA title was extended to include the fateful words "and Motion Picture Machine Operators".

Nobody, we think, can read the proceedings of IA Conventions since 1893 to date without marvel at the basic vitality of mind and body which spawned the growth of this organization.

One of the best expositions of this expansion of the technical forces within the entertainment field, to our mind, was offered by the late Gene Atkinson, then Business Representative of Chicago Local 110, in welcoming delegates to the 38th Convention of the IA in his home town in July, 1946:

So inclusive and penetrating was this statement by Atkinson that it richly merits the closing and most important spot in this brief summary of IA progress (see accompanying reprint from IP for July, 1946, Section 2).

• Burton Holmes is dead. These tour words will conjure up in the minds of both stagehands and projectionists the image of a man who in the early stages of his career had "positive" ideas as to the "proper" presentation of his illustrated lectures which, first presented in 1894, were a standard fixture of show business in a thousand auditoria throughout the length and breadth of America.

Oddly, this undisputed father of the travelogue (shades of James Fitzpatrick and, yes, Cinerama) and the veteran of

a thousand perilous adventures in foreign lands, passed away in his sleep in Hollywood on July 21 last.

Early Tiffs With Unions

Burton Holmes was, at first, adamant anent union labor. At first belligerent, then suspicious, then a bit wary, he finally lent his whole-hearted acceptance to the fact that his presentations depended not entirely upon his running oral commentary—there were, in the early 1890's the slides flicking through his then crude mechanism and, later, the then so very jumpy motion picture images.

Burton Holmes learned his lessons the hard way—in remote places in our firmament at great personal risk.

• Edward Lachman, president of Carbons, Inc. (Lorraine Carbons), has been elected an honorary member of the 25-30 Club of New York, which numbers among its membership only those who have been actively engaged in projection



Edward Lachman

work for 25 years or more. Lachman has long been very active in the promotion of high standards of projection, and quite apart from his sponsorship of Lorraine carbons has made many personal contributions to the welfare of the art and the craft.

Lachman's formal installation is scheduled to take place at the annual Club party in September.



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Optimum Projection Viewing Conditions

The third in a series of excerpts from a presentation originally given before The Royal Photographic Society and, perforce, printed in the official Royal Photographic Journal. The article is available in its entirety from the Society in either the Journal at 4s (approx. \$0.56) or in reprint form (approx. \$0.35), both postpaid, at 16 Princess Gate, London, S. W. 7, England.

By H. HARTRIDGE*

Effect of Light Intensity Upon Color Perceptivity

WE COME NOW to one of the most intriguing aspects of the projection process-that of the effect of intensity of light upon normal visual perceptivity of color values.

If using an ordinary spectroscope, the light intensity be greatly increased (by the employment of an arclamp, or sunlight as an illuminant) or if, on the contrary, it be greatly decreased (by the interposition of suitable neutral-tint filters), then four differences will be noticed in the spectrum—in brightness, in saturation, in length, and in the hues of many of the individual colors.

If the normal spectrum is placed alongside one produced by means of a very bright light, then the latter is brighter, longer, and much less saturated; that is, all the colors appear paler, as if diluted with a very pale color.

In the case of red, orange, and green, the diluting color is a pale yellow. In the case of blue-green, it is white. In the case of yellow and blue, it is white. In the case of violet, it is very pale blue. Thus the red of the spectrum has been changed to a pale salmon-pink, and the green to a pale yellow-green.

Now, these modifications in hue are very similar to, if they are not identical with, those seen by subjects who have a partial red-green deficiency. If the defect were complete, they would see nothing in the spectrum except yellow and blue; but it is not complete and so they see more colors than this.

'Intensity' the Decisive Factor

We can summarize the effects on color vision of a high light intensity by saying that there is a tendency towards red-green blindness, and that the higher the intensity, the greater this trend becomes.

Dealing in a similar manner with the visual effects of a low light intensity, in this case, we find the spectrum to be darker, to be shortened, and to have undergone changes in hue which are the opposite of those produced by a high intensity. Thus, the latter causes red to change to pale salmon-pink (it gains pale vellow); on the contrary, a low light intensity causes red to change to deep crimson (it loses pale yellow).

A high intensity changes green to pale yellow-green (it also gains pale yellow) while a low intensity alters it to deep blue-green (it loses pale yellow).

When the light intensity is sufficiently low, only two colors are visible in the spectrum-red (crimson) and blue-green

-so that it resembles that seen by the yellow- and blue-blind subject.

The application of these facts to viewing is obvious: if excessive, it will cause loss of saturation (the predominance of yellow and blue at the expense of red and green); whereas if it be insufficient, it will cause the predominance of crimson and blue-green at the expense of yellow and blue.

The changes undergone by colors at both the high and low intensities are summarized in the accompanying table relating to Projection Differentials.

World Film Standards Set at British ISO Meet

[The appended data are presented through the courtesy of the esteemed British trade journal, Kinematograph Weekly.]

Decisions affecting screen luminance. release print and sprocket hole dimensions, and recorded sound were reached at the recent meeting of the International Standards Organization at Harrogate, England. Participating countries included the U.S.A., United Kingdom, Germany, Russia, France, and Italy.

The conference decided that the standard luminance for indoor screens used for viewing either 35- or 16-mm prints should be between 25 and 65 "Nits," as measured from any seat in the auditorium.

Note: The "Nit" is the international unit of luminance, with 1 foot-lambert being equivalent to 3.4 Nits; thus the aforementioned standard is not far removed from current practice.

Sanity in Sound Tracks

A standard of 40-50 Nits was prepared for luminance in review theatres and laboratories. Approved was an international standard for 35-mm release prints having one full-width optical and two magnetic sound tracks: one magnetic track will contain the sound record, and the other can be used either as a balancing stripe or for sound in another language. Also decided: the maximum aspect ratio for 35-mm, wide-screen pictures (non-anamorphic) should 1.85:1.

Also agreed upon was an international standard for characteristics for magnetic sound records on both 35- and 16mm film. This agreement . . . means

Too Much

Light

Pale salmon

Pale vellow

green

Grey-green

Pale blue

Blue

Blue

V. Pale yellow-

Pale yellow-green

Salmon

Normal Too Little Light

Color

Yellow-green

Red

Orange

Yellow

Green

Blue

Violet

Purple

Blue-green

Crimson Pink White V. Pale bluegreen Pale blue-green Blue-green Dark blue-green Dark grey Dark crimson

PROJECTION DIFFERENTIALS

How light at varying levels can mean many different things to different people.

[IP's Contributing Editor, Robert A. Mitchell, registers a sharp disagreement with this table, to be expressed in our next issue.]

^{*} Master of Arts, Doctor of Medicine, Doctor of Science, and Fellow of The Royal Photo-graphic Society; also, Emeritus Professor of Physiology, University of London, and Gresham Professor of Physics, Gresham College, London.

standardization of all magnetic sound records, including those used by TV.

Committees were appointed to investigate and prepare proposals for a standard sprocket perforation for all purposes, and to consider film leaders and trailers for 35- and 16-mm films, reels and cores.

70-mm Proposal Rejected

Russia proposed the adoption of 70-mm as the standard for wide-screen release prints that involved the use of film wider than 35-mm. This aroused considerable opposition: it was felt that it would not be wise to standardize on wide film until the possibilities of 35-mm had been exhausted; and that the creation of a standard prematurely could have results more harmful than the existence of no standard at all.

Every country should be invited to express its opinion as to the desirability of standardizing on a 70-mm print, and as to the forseeable usage of wide release prints in each territory.

A specification for safety film has finally been agreed; ISO divided on the subject. United Kingdom, and some others, wanted the film as used in the theatre or laboratory to comply with the spec. Other countries, particularly the USA, thought the spec should apply only to the film as manufactured. It was agreed that the spec should apply to the film as manufactured, but during the next three years, all countries will conduct tests to find out whether normal treatment, such as magnetic striping, was likely to cause a breach of the spec.

Infrared message transmission is under development by Army Signal Corps as near fool-proof way of getting messages through on the battlefield. Since very narrow transmission beam is invisible, the enemy must have a properly designed and tuned infrared detector even to be aware that messages are transmitting.

Wire and radio messages are fed into the transmitter; the receiver can hook into radio transmitter, loudspeaker or phone line.

BODY HEAT keeps battery power supply for U. S. Army radio operators alive longer in extreme cold. Batteries, worn in vest, may stay in service ten times longer under very cold conditions, usually deadly to the power units. A Burgess-developed "Power Vest" for USA Signal Corps.

ANSWERS TO EXAM QUESTIONS

1—B; 2—B; 3—C; 4—D; 5—A; 6—B; 7—B; 8—D; 9—C; 10—C; 11—A; 12—A.



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Gate and Shutter Characteristics

SUPPLEMENTING the second and final article of two which appeared in the last (July) issue of IP (P. 10, et seq.) is the appended record of the discussion which ensued between members of the SMPTE:

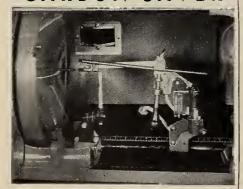
Three prime factors engaged the interest of those engineers participating in the discussion: the radius of the curvature of the gate, the methods of cooling employed, and the difference in thermal



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conductivity (from light source to film) between the two- and the three-blade shutter.

Heat transmission is, of course, the prime "villain" in film buckling in the gate; and the question of whether a curved gate of, by and in itself is of much avail in alleviating this deleterious condition without the aid of auxiliary means, including cooling by either a steady water-flow or airblast, is moot.

Indicative of the thinking by engineers on the important factors in current projection practice, which employs evermounting amperages in order to transmit more light through the film, is the appended commentary.

Discussion

J. S. Chandler (Eastman Kodak Co.): What is the radius of curvature of the gate which was used? Was the curvature so steep as to cause trouble with depth of focus of the lens?

Mr. Borberg: The radius is about 12 inches. The gate conforms with the curvature of depth of field of the lens. The conformance, of course, is not exact for all possible lenses, but it is in the correct sense.

C. R. Daily (Paramount Pictures Corp.): It might be of interest to report at this time another improvement that can be achieved with cooling behind the aperture plate: It seems that when cold film meets a hot film rail, it is more subject to irregular focus than when it enters a cold rail. By using water-cooled aperture plates we very substantially reduced the temperature of the film rails—actually to the point of body temperature maximum for a Hy-Candescent lamp running at 180 amp. The stability of film running was considerably improved.

We were led to this experiment as a result of earlier work with the 250-amp transparency projectors where the stability of film focus throughout a reel was extremely important. The operator can't keep hunting out a new focus position on a transparency reel during the long take. By keeping the rails and gate structure of those machines cold, there was no drift of focus throughout a long run, and the stability of picture on the screen was considerably improved.

Now, by adding water-cooled apertures to the water-cooled trap behind the film area, there is less focus-drift throughout a whole reel than we had before. There still is a residual drift due to internal absorption of heat by the projection lens itself, but that is another problem that needs to be solved.

Mr. Borberg: I'd like to say that this curved gate is available with a water-cooled plate against which the aperture rests so that not only the aperture, but all other film contacting surfaces as well, are kept relatively cool.

Ralph Heacock (Radio Corp. of America): About five or six years ago we made three-bladed single shutters and were quite impressed with their operation in the laboratory. We placed them in screening rooms from coast to coast in one of the large chains, but after they had been in use for a short time we began to get complaints. As a check, we set up one projector with a three-bladed single-shutter setup, and left the other with the twobladed single shutter setup. Then we asked the exhibitors and anyone else who came into the screening room which one they preferred. The two-bladed shutter came out ahead.

Even though the three-bladed shutter had the advantage of 72-cycle shutter blade flicker, the period of white screen was so very, very short with relation to black screen that apparently the eye was interpreting the disproportionately short white screen and long black screen as flicker. From a practical viewpoint, we put back the two-bladed single-shutter mechanisms and that's the way they're still used.

With the double-shutter projectors, we had enough advantage so that this condition did not exist. But from a practical viewpoint we found that using three blades on single-shutter mechanisms did not work

Have you experienced this same effect in the three-bladed shutter test that you described?

Mr. Borberg: Yes, we do recognize that the ratio between light and dark periods makes a difference in performance on the screen. As you described, the long dark period and short light pulse combination is not as pleasant to look upon as if it were the other way around.

The additional effect that we are detailing is that with the three-bladed shutter, the extreme buckle excursions during the necessarily high intensity light pulses can also give a sensation resembling flicker. It is not exactly flicker but it is unpleasant to look at and annoying, just as flicker is.

Merle Chamberlin (M-G-M): I would like to add one thing to the film-cooling experience that Dr. Daily brought up. It seems from our experiments at M-G-M that little bits of all of these improvements are needed to help out with focus. The water-cooled back plate has been very advantageous and, as all of you know, there

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is an attachment available on the open market for water-cooling the back plate of all projection machines. As far as the three-wing shutters are concerned, I'm inclined to agree with Mr. Heacock and Mr. Borberg. Our experiments have taught us that, with the exception of any picture having wide open ocean or bald sky, most people definitely prefer the longer illumination periods of the two-bladed shutter.

VERY HIGH VOLTAGE power transmission on a large scale may be in the offing for this country. Already Sweden, the Soviet Union. France and Germany have 400-kilivolt systems, but the highest voltage installations in the U.S. so far are the 345-kv lines of American Gas and Electric Co., Bonneville Power Administration, and a new Commonwealth Edison Co. installation.

Extra-high voltage systems are essential to nation's continuing progress since they carry larger amounts of power farther and more efficiently.

OVERSIZED SHOCK-WAVE photos of objects as large as jet planes are made by new technique, developed by Dr. Harold Edgerton, M.I.T. Conventional shockwave photos are small, costly made under limited conditions. With new method, object moves between billboardsized sheet of highly-reflective material, "Scotchlite," and camera. Camera's fast mechanical shutter, small aperture, and small high-speed flashlamp set as close as possible to lens give effect of having camera and light at focal point of spherical mirror as big as the glass-bead screen.

FIRE-RESISTANT material has been found in banana stalks, may lead to production of new fire-retardant for building materials, according to report by U. S. Forest Service's lab, Madison, Wis. Tests show that fire-resistant material in stalks is largely potassium carbonate.

OBITUARIES

AMSLER, CARL EUGENE, 56, member of Local 447, Springfield, Mo., died of a heart attack while sitting at the dinner table with his family and relatives. Born in Billings, Mo., Amsler lived and worked in Springfield nearly 30 years. He joined Carthage (Mo.) Local 595 in 1927, and after working in Springfield theatres for a number of years transferred his membership to Local 447. He served several terms as president of the Springfield Local and at the time of his death was a trustee. He was vice-president of the Industrial Trades Council; and was a member of the Billings Masonic Lodge, and the Springfield Chapter 15 Masonic Lodge.

He is survived by his widow and a son,



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LETTERS TO THE EDITOR

CinemaScope Sprockets

To the Editor of IP:

As you know, theatre circuits are very cost-consicous, and their maintenance departments are constantly on the alert to save wherever possible. In our discussions with the men who maintain the equipment, we have had no adverse criticism of CinemaScope sprocket life or film damage. Naturally, we are interested in this problem, as any film damage caused by our product would have an adverse effect on our sales.

Is there a possibility that the film damage referred to by Mr. Mitchell ("Sprockets . . .," page 5, et., seq., IP

for July 1958) may have been caused by so-called "fox-hole" sprockets that were ground down from standard sprockets? In the early days of Cinema-Scope, there was such a rush for narrow-tooth sprockets that many theatres took standard sprockets and ground the teeth to fit the new perforations. As a result, the teeth were down to 0.030 wide; and we did hear reports of film damage. These sprockets were 0.935 diameter.

Hazard Foreseen Early

The CinemaScope intermittent sprocket is 0.953 diameter and the teeth are 0.040 wide. We did grind some of these sprockets in the early days; however,

we did it only because of pressure, and cautioned our customers against their use and made it clear that we could assume no responsibility for film damage.

We recommended replacing them with the recommended CinemaScope sprockets as soon as they became available. We have not re-ground any since 1953; however, we have heard of several shops still performing this service.

Our current catalog states that narrowtooth sprockets do *not* decrease film life. (We refer, of course, to sprockets made to SMPTE standards.) We see no reason to change this opinion, unless concrete evidence to the contrary is forthcoming.

We believe a thorough investigation of this situation would be in order, so as to avoid any misunderstanding.

Tom LaVezzi LaVezzi Machine Works, Chicago, Ill.

Note: As far as I know, the matter mentioned by Mr. La Vezzi has not yet been intensively investigated by impartial industry groups. Different film companies have issued data favorable to their own point of view; professional societies do little more than echo producer opinion; and very few distributors and equipment-servicing technicians are willing to commit themselves one way or the other.

The writer's own test data anent the wear characteristics of CinemaScope sprockets and film perforations are nevertheless supported by the working experience of many practising projectionists and exchange inspectors.

It can readily be appreciated that a film or sprocket longevity-factor of 20% less than the norm is easily masked by other factors of a variable, and often more serious nature. The continued use in some theatres of wornout sprockets, excessive gate tension, and improperly adjusted idler rollers has a random effect upon the wear of prints of any particular class. Gate tension appears to be the most important factor affecting the wear of intermittent sprocket teeth of specific dimensions and physical hardness.

Insists Print Life is Shortened

If all data could be collected and averaged, however, it is reasonably certain that, as stated in my July article on the basis of my comparative tests, standard-perforation release prints have a perforation life 80% of normal when played exclusively on projectors fitted with narrow-tooth sprockets of the best manufac-



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ture, all other factors of use remaining the same.

Exchange inspectors assure me that CinemaScope magnetic-track and magoptical prints subjected to considerable use in magnetic soundheads deteriorate more rapidly than normal prints in many ways, not the least of which is excessive scratching of the film. A print life of much less than 80% of normal is indicated on the basis of an equal number of playdates. This does not mean that such a print is kept in use for only a short time, for any projectionist experienced in subsequent-run showings can describe the atrocious condition of some of these prints in eloquently rich language.

I have in my possession a number of "fox-hole" print clips submitted by projectionists from all parts of the country. While useless for data of a statistical nature, these clips show severe perforation damage of the type which would be expected from the ground-down sprocket teeth mentioned, and rightly condemned, by Mr. La Vezzi. (Chewed-up perforations in leaders are a frequent source of irritation.) Similar damage has been frequently observed in the standard perforations of regular prints, indicating frequent playing on projectors fitted with sprockets having inexpertly ground-down teeth.

Narrow-Teeth Sprocket Misuse

My personal concern is concentrated mainly on the effects of undersize sprocket teeth on prints having regular perforations. This concern increases as the use of magnetic reproduction falls off. (Many theatres having magnetic soundheads use the optical track of magoptical prints, substandard though it is.) In my opinion, the introduction of the magoptical print with its inferior narrow soundtrack and its inferior undersize sprocket holes furnishes a prime example of the efforts of the proponents of CinemaScope to further undermine the former high technical quality of theatrical motion pictures. It seems incredible to me that the owners of opticalsound theatres would allow themselves to be forced into the use of CinemaScope

My criticism is directed against a process, not against a specific product. I may perhaps mention that I have been a satisfied and enthusiastic user of La Vezzi projector parts for many years. But I see no good reason to accord approval to SMPTE or other "official" sanctionings of producer standards which degrade projection and sound quality, even if only slightly. The beleaguered exhibition industry can ill afford innovations of a commercially negative character.

ROBERT A. MITCHELL

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THE PROBLEM OF SHUTTER FLICKER

(Continued from page 6)

television picture tubes are coated continue to glow for a short time after the electron beam has excited them; so instead of an actual dot of light whizzing over the screen at breathtaking speed, the picture is actually formed by streak-like fragments which appear first at the top of the screen and move down to reach the bottom and complete the picture in slightly less than 1/60th second. Because of the "glow-persistence" of the fluorescent coating, therefore, any one point on the face of the picture tube is dark "only" from 95% to 99% of the total time!

Special picture tubes for kinescope recording and flying-spot image-pick-up utilize phosphors having an extremely short glow-persistence. In these the picture is actually formed by a microscopic dot of tremendously bright light flying over the face of the tube. And no matter how bright

the picture looks to the eye, any one point on the face of such a tube is dark for more than 99.9997% of the time!

The flickerless quality of television pictures (60-cycle system) is TV's single pictorial advantage over regular direct film projection. In every other way, however, theatre motion-picture images are far superior to TV images. Projected movies have greater image resolution, a vastly wider contrast range, automatic black-level and brightness control, the absence of moiré effects (due to scanning), and superior natural color. Nevertheless, the standard 48-cycle shutter frequency inevitably causes perceptible flicker on brightly lighted screens.

"Dark-to-Light" Ratio

Standard film projection, we have seen, involves a succession of 48 dark intervals each second, each lasting 1/96th second. The screen is thus dark 50% of the time and illuminated 50% of the time. We have also seen that the face of a TV picture tube is dark (at any one point) for more



NATIONAL THEATRE SUPPLY COMPANY . BRANCHES COAST TO COAST

than 95% of the time and illuminated for less than 5% of the time.

Now, it has been discovered that flicker becomes less noticeable when the duration of the illuminated intervals becomes greater in proportion to the duration of the dark intervals, the cutoff frequency remaining the same.

For this reason, a picture projected with a shutter having two 60-degree blades (120-degree openings) seems to flicker less than a picture projected with a shutter having two 90-degree blades (90-degree openings), picture brightness and cutoff frequency remaining the same.

Standard 3-to-1 geneva intermittents require shutter blades at least 90° in angular width (50% light transmission), but projectors having 5-to-1 intermittents are able to utilize the narrower 60° shutter blades (66.7% transmission) for brighter pictures with no increase in perceptible flicker.

Television, with its practically instantaneous flashes of illumination, is in the worst possible position with regard to flicker when the field rate is low. The TV cutoff frequency of 60 cycles per second is high enough to make flicker imperceptible at all brightnesses below 23 foot-lamberts (which is slightly more than double the recommended brightness for motion pictures).

Silent films, with their standard frame rate of 16 per second, could not be shown without strong flicker on projectors having 2-blade shutters. The movies were aptly called "the flickers" in the old days! At a cutoff frequency of only 32 cycles, a screen brightness no greater than about 1 foot-lambert could be tolerated without flicker. This is one of the reasons why the Powers projector with its 5-to-1 intermittent and 3-blade shutter (48 cycles at 16 frames per second) gained tremendous popularity among projectionists in the days of the silent photoplay. The Powers permitted screen brightnesses up to 7 footlamberts without flicker at silent speed (a foot of film a second, 15 minutes per reel).

Todd-AO and TV Compared

Flicker was eliminated from 70-mm Todd-AO presentations by the adoption of a frame rate of 30 per second.



The resulting cutoff frequency of 60 cycles with a 50%, 2-blade shutter tolerates screen brightnesses up to $43\frac{1}{2}$ foot-lamberts.

American commercial television likewise has a cutoff frequency of 60 cycles, but because the image is produced by virtually instantaneous flashes, the flicker threshold is equivalent to a screen brightness of 23 footlamberts. Although this level represents a rather bright picture, home TV scts having new picture tubes are frequently operated at an equivalent screen brightness of more than 40 or 50 foot-lamberts. Flicker is perceptible in the picture highlights at these high levels.

European television standardized for 50-cycle mains A.C. tolerates only 6 foot-lamberts of equivalent brightness with short-persistence picture tubes, or nearly 15 foot-lamberts with tubes of long glow-persistence.

Among the curiosities of projection technology are the so-called "continuous" projectors which optically dissolve each frame of film into the succeeding frame on the screen without shutters or intermittent movements. The Mechau projector utilizing a rotating wheel of vibrating mirrors is one of the more successful attempts at continuous projectionbut not sufficiently successful to have gained projectionist acceptance. But despite their technical flaws, continuous projectors climinated shutter flicker and permitted frame rates as low as 8 per second with no flicker

This article barely scratches the

surface of the vast subject of shutter flicker. Other interesting factors will be mentioned in the concluding installment.

[TO BE CONCLUDED]

SCIENCE NOTES

EXPLOSIONS FROM SPARKS can be caused just as easily by tools made of such "non-sparking" materials as copper as by tools made of steel, according to U. S. Navy researchers. Their work also shows that (1) metallic sparks can be caused by contact between non-sparking and sparking metals and (2) impact is more dangerous as a source of ignition than friction.

"Windowscreen" magnetic memory consisting simply of wires woven together like screen wire will greatly simplify electronic memory systems, according to scientists at Bell Telephone Laboratories, New York. Sending a short impulse of current along both its longitudinal magnetic wires and transverse plain copper wires produces the memory "bit" at wire junction in form of a permanent magnetic field. Sending another impulse down the copper wire and measuring output of magnetic wire tells whether magnetic wire is magnetized, that is, if it contains "remembered" material.

ELECTRICALLY-CONDUCTIVE paper built up of metal fibers just like paper made from wood pulp has been developed at Hurlburt Paper Co., South Lee, Mass. It also resists extreme temperatures, has magnetic properties, conducts heat. While they look like metal foil, the most successful types have been combinations of metal, synthetics, glass or paper.



A bullet for Charlemagne

The thickset Caco general got slowly to his feet. Behind him, in the darkness, stood an ugly backdrop of a hundred Haitian outlaws. At his feet, a woman stirred a small fire.

Confronting him, the tattered young man in blackface disguise saw the fire gleam on his white silk shirt and pearl handled pistol and knew this was the murderous chieftain, Charlemagne Masena Peralte. The man he'd come for, through a jungle and a 1200-man encampment, past six hostile outposts, risking detection and certain death.

Charlemagne squinted across the fire. "Who is it?" he challenged in Creole.

There was no alternative; Marine Sergeant Herman Hanneken dropped his disguise, drew an automatic, and fired.

The night exploded into gunflame, most of it from Hanneken's second-in-command, Marine Corporal Button, and his handful of disguised Haitian gendarmes. But the shot that killed Charlemagne was the one which would finally end Caco terror and bring peace to Haiti.

Sergeant Hanneken is retired now-as Brigadier General

Hanneken, USMC, with a Silver Star for Guadalcanal, a Legion of Merit for Peleliu, a Bronze Star for Cape Gloucester, a Gold Star, and a Navy Cross. And, for his incredible expedition against Charlemagne, November 1, 1919, the Medal of Honor.

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Monthly Chat

IP's Non-Theatrical Service

GRAPHIC communication is making deep inroads into the area heretofore dominated by the spoken word, and the spearhead of this penetration is audio-visual equipment ranging from 35-mm soundfilm projectors and multiple-speaker installations in large auditoria down through 16-mm units to slides and film strips in smaller confines.

And what about closed-circuit TV, whether at long range or in the form of self-contained "package" systems, or interclassroom or inter-plant communication? These systems will definitely be not elective but requisite in the future.

There exist no barriers which may not be pierced by these means. Irrespective of how these spheres of activity be designated—educational, industrial, merchandising, religious, fraternal, military—the end-result is precisely the same: communication.

Upon publication some 18 months ago of what has now come to be the standard manual of projection practice (ROBERT A. MITCHELL'S MANUAL OF PRACTICAL PROJECTION), IP was engulfed by a tidal wave of requests from non-professional personnel for advice as to how best to utilize the equipment they were then using or were anticipating purchasing. This reaction to a volume which includes not a single word relative to curricula or teaching technique dictated the answer to what had long been, to our mind, a perplexing question. The answer, which also presupposes the question, is that these competent persons simply did not know and were not told how best to utilize the fine equipment made available to them. Obviously, mere manufacturers' bulletins fall far short of conveying the technical "know-how" so vitally necessary to the proper application of the equipment.

Comprehensive Equipment Data the Order

For this reason IP purposes expanding its services to the audio-visual field, to include not only the technical details of a given unit of equipment but also its proper application in a given situation and, of the utmost importance, its maintenance. Its warrant for following such a course, if one be needed, is its 27 years in reporting on and evaluating equipment, technique, and contingent events in the professional audio-visual field.

IP's editorial policy for this expanded department will be the same as that which has guided its course in the past: complete freedom of expression in its columns for anybody having anything worthwhile to offer relative to equipment or technique.

[Parenthetically, we issue an advisory that throughout the United States and Canada there are at least two score "old pros" who, drawing on their long experience in the professional sound motion picture field, render a comprehensive service in the renting, servicing, and selling of equipment for all non-professional uses. This complements those many units of the organized projection craft which maintain special departments for all phases of non-theatrical presentations, with emphasis upon maintenance.]

Essaying what is admittedly a difficult task, IP is acutely conscious of the fact that a prime requisite for a rewarding discussion on any topic is to first agree upon a definition of terms.

It would seem that at the moment the weakest link in the chain encircling the A-V field is that which embraces the area of technological know-how. This link we hope to strengthen.—James J. Finn.

SAA



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INTERNATIONAL PROJECTIONIST

Volume 33 SEPTEMBER 1958 Number 9

Sprockets, Film Perforations and Triacetate Film Prints

Several recent articles in IP relating to the basic implements used in the projection process, as contrasted with operational technique, attracted widespread interest within and without the craft. Notable among these were "Focus Drift," by James J. Finn (IP for June), and "Sprockets and Film Perforations," by Robert A. Mitchell (IP for July). Figuring prominently in these and other articles was the charge, and the denial, that triacetate ("safety") film was somehow a major contributory factor to projection deficiencies.

The appended commentaries reflect the *combined* views of three major research laboratories and, in the opinion of IP, constitute a significant contribution to the literature of the art.

"Sprockets and Film Perforations"

WE HAVE considered carefully Robert A. Mitchell's article (cited above) and would comment that in general his discussion of how sprockets work agrees with our studies of the process. There are sections where we would have given the facts slightly different emphasis, or would have worded the statements differently, of course.

The main disagreement between Mitchell's observation and our data concerns the section headed "Foxhole' Sprockets Unsatisfactory," wherein he states: "Narrow-tooth sprockets are undoubtedly harmful to regular prints. CinemaScope magnetic-track prints... have slightly less than half the useful life of standard optical-track prints played exclusively in projectors having standard wide-tooth sprockets."

This statement is contrary to the facts established by our continual trade surveys of film in actual use, and by our laboratory testing of film.

Direct examination of prints in the theatres and exchanges across the country, and of junk prints sold as scrap, shows that most prints go through their entire useful life without significant perforation wear. Actually, we observe that 4-track magnetic prints are in better condition than are optical-track prints, and many of them receive so few bookings that they look brand new.

Mag-Optical Print Problem

Currently, mag-optical prints are being introduced so that the same print may be booked for either 4-track magnetic or 1-track optical reproduction. Trade experience has been limited, but both print observations and laboratory tests show no change in performance. In some instances we have noted that exchanges may receive only mag-optical prints; this presents a real problem when a theatre in that area takes Mitchell's advice and retains wide-tooth sprockets on its projectors.

If a mag-optical print is booked into a theatre with wide-tooth sprockets, the print will run for two or three bookings but the corners of the perforations will be cracked and torn by the mis-fitting teeth. The non-conforming theatre may obtain a complete presentation but only at the expense of considerable perforation trouble for those theatres who receive the print later—even when these later-run theatres themselves have proper sprockets and good equipment.

Extensive laboratory tests set up to duplicate the various projection conditions show that there is a negligible change in perforation life when the width of the sprocket tooth only is reduced from 55 mils to 40 mils. This is true not only for film with CS perforations but also for film with KS and DH perforations—i. e., all of those recognized by the American Standards Association.

Obviously, when the tooth width is reduced to a certain point it will begin cutting into the perforation, but this limit is safely below the 40-mil width.

Many sprocket design factors other than tooth width influence film wear. IP is certainly aware, for example, that the CinemaScope sprockets have a root diameter of 0.953 inch.; while the older wide-tooth sprockets have a root diameter of 0.943 inch (increased from the pre-war 0.935 inch). All of the laboratory and trade data show that this change alone has a tremendous effect upon film perforation life, as witness:

Some Startling Statistics

For today's films, the relative perforation life for identical films identically used is approximately:

These data are the same for both 40-mil and 55-mil tooth sprockets.

All of the aforementioned advantages may not be realized on every projector because, as IP well knows, many factors other than sprocket diameter are changed in the normal installation. Nevertheless it does help explain what can be seen in the examination of great numbers of current prints.

There is of course accidental and care-

less damage to films. The experience of La Vezzi (IP for August) parallels ours and we, too, caution against conventional sprockets which have had their teeth ground down to permit entry into CinemaScope perforations. Such sprockets will be of smaller diameter and they must be overground because the widthwise gauge is already too small; they will frequently be worn sprockets; and finally the grinding may not be done with the precision given sprocket manufacture.

Loosely-Wound Print Damage

Trouble also occurs from handling film too loosely wound. Because of the additional thickness of striped prints they frequently come closer to filling reels, especially shipping reels. When such reels are wound with poor tension control the film may project beyond the flanges and be damaged when fitting the reel into the shipping case.

The accidental damage we have observed in trade surveys of striped prints is rare; it usually results from an eccasional poorly-maintained projector which damages the print in a *single pass*, or from a poorly-wound roll damaged in the shipping case.

Acetate Film

WE MAINTAIN a close contact with the performance of our 35-mm film during trade use through visits to film exchanges and examination of prints during their commercial use. This is supplemented by projection tests in our laboratories under conditions of varying light intensities covering the range used in theatres around the country. The quality of film is evaluated both from the standpoint of projection quality and mechanical wear.

Our experience in the early years of triacetate use was that this film was in no way inferior to nitrate in steadiness on the screen, under either normal or high light intensities. We have maintained this same quality up to the present time, and while nitrate film is not now available for direct comparison, we have good reason to believe that the same relation would hold.

Print Wearing Quality

The mechanical wearing quality of triacetate has also proved entirely adequate in that prints have remained in good condition throughout their useful life in film exchanges, except for minor cases of occasional damage which always occur. Here the performance appears to be if anything slightly better than nitrate. This is probably not because of any superior physical properties in the film as manufactured, but possibly due to the fact that nitrate, as IP

Toronto L. U. 173 Pension-Retirement Plan

Here is the first publication of the details of the pension-retirement plan effected recently by IA Local 173 of Toronto, Canada. This plan provides for joint employee-employer contributions, based on weekly wage. These data are offered not as a *model* but rather as a *guide* for those units which may be considering similar plans.

Normal Pension Age

Normal Pension Age is attained on the first day of the month following the 70th birthday. Employees who were members of the Union on June 1, 1958, and who will be over age 50 on the birthday following the date of *first* becoming eligible, will attain Normal Pension Age according to the following scale:

Age Next Birthday Normal Pension Age on Date of First is Attained on 1st of Becoming Eligible the Month Following the 50 and under 70th birthday 51 71st 52 72nd etc., until etc., until 84th birthday 65 and over 85th

Amount of Pension

The pension payable at Normal Pension Age will be the amount bought by the contributions (employee and employer) as stated hereinafter.

How Pension is Payable

The pension at Normal Pension Age is payable by *monthly* instalments for 5 years *certain*, and as long thereafter as the member shall live. The first payment of pension will be made on the

date on which Normal Pension Date is attained.

Early Retirement

If an employee retires within 10 years before Normal Pension Age, he may take a smaller pension, which would commence immediately. This pension would be payable by monthly instalments for life, but as a minimum would continue until 5 full years' instalments had been paid. This Early Retirement Pension will include the full benefit of the Employer's contribution paid prior to the date of retirement of the employee.

Late Retirement

If, with the consent of the Union, a member continues in the service of an Employer after Normal Pension Age, payment of pension may be postponed until actual retirement, with a maximum postponement of 10 years. On that date an increased pension will become payable, the amount of the increase depending on the age at the date of retirement. During the period of deferment, contributions by the employee and the employer will be continued and will serve

(Continued on page 15)

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knows, had limited stability with age, and may have become weaker and therefore somewhat more susceptible to damage as it became older.

These results have indicated that we have a good product which is giving satisfactory service. For this reason we

have not introduced major changes in the film base since triacetate was originally adopted. Certain improvements have been made which contribute to assurance of uniform quality in all of our product, and give a slightly higher tear value.

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The Problem of Shutter Flicker

S CREEN BRIGHTNESS, shutter cutoff frequency, and the ratio of light-to-dark intervals (shutter transmission) are the prime factors affecting the perception of shutter flicker in motion pictures. There are, however, other factors which must be considered in connection with the flicker problem. Dr. W. Arndt listed a total of eight factors in an article published in *Die Kinotechnik* for July 5, 1935, as follows:

- 1. Number of cutoffs per second
- 2. Type of shutter employed
- 3. Intensity of picture illumination
- 4. Brightness of surrounding field
- 5. Viewing angle
- 6. Color of picture
- 7. Central or peripheral viewing
- 8. Viewer's flicker-sensitivity

The second factor in Dr. Arndt's list may be expanded into four items which are more specific from the projectionist's point of view. namely: 1) angularwidth ratio of openings to blades; 2) number of blades and speed of rotation; 3) effective diameter in relation to diameter of light beam, or time required to cut the full width of the light beam, and 4) symmetry or asymmetry of blades and openings. These factors increase Arndt's list to 11 items; although our own tests indicate that the factor of color (No. 6) possesses too slight an influence to be considered as important.

Effect of Color

The writer has thoroughly investigated the effect of color upon flicker perception under the most carefully controlled conditions. Not only was the flicker-perception effect of color fields compared with that of white fields (color temperature = 5500°K.), but simultaneous tests of two saturated-hue color fields placed side-by-side leave no doubt as to the results and conclusions to be drawn therefrom.

When fields of different color have exactly the same brightness, their flicker characteristics at the center of the field of vision are the same.

Monochromatic primary red (660 millimicrons in wavelength), green (522 mm.), blue (465 mm.), additive combinations of these, and spectrum violet (415 mm.) were specially investigated.

The only appreciable effect of color upon flicker resides in the peripheral

By ROBERT A. MITCHELL

The second of two articles which treat with a vexing problem of motion picture reproduction—flicker.

("corner-of-the-eye") region of vision.

Primary red, for example, evidences less peripheral flicker than primary blue, but only because the peripheral region of the retina is much less sensitive to red than to blue. Green-perception is not confined to the central area of the retina as much as is red, nor does it extend over such wide angles of visual perception as does blue.

"Cold" vs. "Warm" Light

For this and for psychological reasons, flicker of motion-picture screens illuminated with the "colder" colors (cyan, blue, violet) appears more objectionable than an equal amount of central-field flicker of screens illuminated with the "warmer" colors (red. orange, yellow). The blues and other cold colors appear relatively "harsh" and their harshness is accentuated by peripheral flicker which is less pronounced with the warmer colors, and which is always more severe than foveal flicker when the entire field has uniform brightness.

These observations possess a psychological import bearing upon tinted positive-film stock, widely used to great dramatic advantage in the days of silent movies, and upon the color, or color temperature, of the projection illumination employed for monochrome (black-and-white) prints.

The color temperature of projection light must not be less than 5500°K. (mean noon sunlight) nor higher than 6000°K. (normal high-intensity carbonarc) in order that natural-color prints be reproduced properly. The only way to reduce the color temperature of the light for more comfortable viewing of black-and-white films, therefore, is to interpose a color filter in the beam. The film, itself, acts as a color filter when the base is tinted; and tinted film makes possible *instantaneous* changes of color for dramatic reasons.

Now that it is possible to use photoelectric cells which respond to the infrared wavelengths transmitted by nearly all organic dyes, the soundtrack is no longer an obstacle to the use of tinted stock for dramatic effect and to "kill" the monotonous chalk-white harshness of the high-intensity arc in productions not filmed in natural color.

Illuminated Screen Surrounds

Even though Arndt's factor No. 4 (the brightness of the field surrounding the screen) has a marked effect upon the apparent violence of the flicker, it neither raises nor lowers the flicker-perception threshold level. That is to say, a steadily illuminated screen surround may cause visible flicker to appear more noticeable, but it does not induce a perception of flicker when shutter-rate and brightness factors are such that no flicker is seen on a screen with black surround masking.

In general, therefore, the conventional black-masked screen in a dark auditorium best reduces the prominence of any flicker which may be perceptible. thus enhancing the desired illusion of smooth, continuous picture illumination.

Arndt's flicker-factors Nos. 5 and 7 concern the effect of peripheral flicker, always more pronounced than flicker of the directly-viewed area, and need not be discussed further despite their importance in wide-screen viewing. The individual flicker-sensitivity of the observer (No. 8), also a significant factor, is not only different for different persons, but varies in the same individual under different conditions.

Previous exposure to bright daylight, for example, increases sensitivity to flicker and requires threshold curves somewhat higher than the normal curves given in the inclusive graph accompanying the previous installment of this article (IP for August, p. 6).

Shutter Symmetry Essential

Of greater interest to projectionists than the more subtle factors affecting flicker perception are those tried-andtested principles of shutter design and projector operation which insure an absolute minimum of flicker. And the first of these basic principles is that, regardless of the cutoff frequency, and regardless of the width of the shutter blades, both the blades and the openings must be perfectly symmetrical. All of the dark intervals must be of equal duration, all of the illuminated intervals must be of equal duration, and both

^{*} Degrees Kelvin denotes Centigrade plus 273.

must follow one another with perfect regularity.

A shutter that fails to meet these conditions in its action unavoidably generates excessive flicker—unnecessary flicker.

If one blade of a 2-blade shutter be wider or narrower than the other, violent 24-cycle flicker will be superimposed over the normal 48-cycle cutoff frequency. The same effect of 24-cycle flicker is produced by unequal width of the openings. It is impossible to "cheat" even a little bit on the width of the balancing blade and avoid 24-cycle flicker!

Since one blade of a 2-blade shutter cuts off the light during the film pull-down (the "master blade") and the other merely doubles the cutoff frequency by cutting the light in the middle of the "dwell" period (the "balancing blade"), it may seem that the width of the balancing blade might advantageously be slightly reduced for increased light transmission.

Not so! Although reduction of the width of the balancing blade cannot produce travel-ghost, this expedient generates the objectionable 24-cycle flicker. It is therefore absolutely mandatory to employ equal angular widths of the two shutter blades.

Shutters having perforated or transparent-tinted balancing blades are just as bad, or worse, than plain shutters cut from incorrectly marked sheet metal. The shutter having a perforated balancing blade has been claimed to transmit more light than regular shutters; and while this claim may be true, such a shutter not only produces 24-cycle flicker, but faint travel-ghost extending all the way from the bottom to the top of the screen. Balancing blades of dark blue gelatine produce flicker and dark blue travel-ghosts.

Rapidity of Cutoff Important

The fundamentals of shutter design and operation are so clearly defined that only the most ill-informed projectionist could be "taken in" by the purveyors of freak shutters. Use no shutter that is not approved by the manufacturer of the projectors.

The efficiency of any projector shut-

ter depends directly upon the rapidity with which its blades cut through the light beam. Screen illumination should be cut off as quickly as possible, and, after the proper interval of obscuration, restored as quickly as possible. The light beam should thus have a reasonably small diameter in the cutoff plane (which means that the cutoff plane should be as close to the aperture as possible), and the shutter should have a large diameter.

In this way the angular widths of the blades can be reduced fairly close to the theoretical minimum blade width of 90 degrees for the regular 3-to-1 intermittent, or to 60 degrees for the more rapid 5-to-1 intermittent. Wider blades, though necessary when the light beam is large or when the velocity of cutting is low, waste precious light.

Cutoff time is halved by the use of 1-blade shutters revolving twice as fast as 2-blade shutters and also by double-acting shutters which cut into the light beam from both sides at once. Double-acting shutters exist in a wide variety of forms and are well known to projectionists.

All cylindrical, or barrel-type, shutters are automatically double-acting because as the edge of one blade cuts down through the beam, the edge of the opposite blade cuts up, the beam being finally extinguished in the middle.

Double-acting, fan-type shutters utilize blades rotating in opposite directions (Century CC and HH, RCA Brenkert BX-80) or rear-and-front components mounted on the same shutter shaft (Simplex E-7, Brenkert BX-62). Both the rear and front shutters revolve in the same direction, but they produce the optical effect of cutting the beam from opposite directions. This is because the projection lens is between them—the lens reversing the beam so that its bottom rays on the lamphouse side are its top rays on the screen side.

The old-style single front shutter was remarkably efficient in the days of small lamphouse mirrors or condensers because it could be positioned to cut the beam at the point where the "aerial image" of the mirror or condenser was formed—2 or 3 inches in front of the

lens. At this point the beam issuing from the lens has a slight constriction, or "hourglass" kind of narrowing. The constriction is not so noticeable when large lamphouse mirrors are employed; and the usefulness of the single front shutter is further limited by its failure to reduce the heat of the aperture and film.

There was nothing new about the rear-type shutter even when first used on American theatre projectors (about 1930), for many of the very early silentfilm projectors used such a device for added safety and to reduce film heating. It has always been known, however, that the single disk-type rear shutter is the least efficient type of all as regards shutter action and light transmission. Many manufacturers have continued to use it because of its mechanical simplicity.

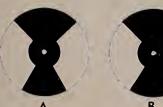
The writer once worked in a theatre so mean and impoverished in the projection department that one of the two Simplex Regular mechanisms still retained the front shutter inherited from the days of Rudolph Valentino's flickering amours. While such a setup was undeniably a blow to any projectionist's pride, it furnished an excellent opportunity to compare the merits of front and rear shutters.

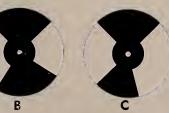
When both shutters were adjusted for maximum efficiency without the appearance of travel-ghost, there was no doubt that the old-fashioned front shutter resulted in better light, a better focus, and a "snappier" image than the more modern single rear shutter. Needless to say, the efficiency of the front shutter was purposely reduced to match that of the rear shutter—else change-overs would have been noticeable.

Of the shutters used in modern mechanisms, the cylindrical, double-disk, and conical types are the most efficient. The single conical shutter, such as that used in the British SUPA and the American Simplex X-L, has the advantage of a cutoff plane very close to the aperture, where the effective light beam has a small diameter. A double conical shutter, presumably more efficient than any available shutter, was used in one of the earliest projectors, the Optigraph mechanism of 1898. The use of a singleblade conical shutter would be a great advantage; and the problem of counterbalancing such a shutter, though mathematically complex, is not unsolvable.

Cylindrical shutters are used in nearly all projectors of European manufacture and in the Motiograph H, K, and AA. This type of shutter is very efficient and compact, although it does not well accommodate the excessively wide light beams thrown upon the aperture by modern "fast" reflector lamps. It is also a source of projectionist dissatis-

(Continued on page 17)





Three
Shutter
Types

These shutters produce severe 24-cycle flicker superimposed upon the 48-cycle cutoff frequency because of asymmetrical relationships among the blades and the openings. Shutter A has blades of different angular widths, hence asymmetrical openings. Shutter B has asymmetrically-placed blades, hence openings of different angular widths. Shutter C, with asymmetrically-placed blades of different widths, suffers from both defects.

The Geneva Intermittent Movement: Its Construction and Action

By A. C. SCHROEDER

Member, IA Local Union 150, Los Angeles, California

The second in a series of articles which detail the what, the why and the how of the "heart" of the motion picture projector.

A NOTHER problem arises when we increase the size of the cam. A graphic presentation of this condition is offered in Fig. 4 wherein we make the cam inordinately large in proportion to the star: the three solid lines represent the side and end of the slot, the circle represents the pin, and the dotted line with the arrow at its end continues on to the center of the cam. The lock ring is not shown.

Arrow D indicates the direction of pin travel at this instant. Note that the pin just clears the upper edge of the slot; but E, which is closest to the lower edge of slot, still is some distance away, as is indicated by the space between E and F. As the pin travels further it again leaves the upper right of the slot, and the distance between E-to-F becomes less, until we reach the position shown in Fig. 5 at the instant that contact occurs.

Arrow G (Fig. 5) indicates the direction of the pin and shows the point of contact. The distance between the pin and the upper edge of the slot has now increased to H-to-I. The lowest extremity of the pin is now below the lower edge of the slot, as is indicated by the dotted line. One might say that the pin has moved ahead of the star, thus the star must snap ahead at a terrific speed, instantly, to make way for the pin.

Since the pin is positively-driven and cannot rebound, this impact causes the star to rebound, resulting in again opening a space at the point G. What occurs next depends upon the weight of the star and associated parts, the weight of the intermittently-moving portion of the film, and the friction due to the tension shoes. With heavy parts and light tension, the star flies ahead until it "catches up" with the pin, resulting in contact of H and I, with the possibility of another rebound here. The pin will now be far enough into the slot to prevent further erratic action, such as rebounding.

On the other hand, with very light parts and relatively heavy film tension, H and I will not touch; but the second contact occurs at G, where there is a possibility of another rebound.

Higher Speed, Closer Tolerance

The degree to which the aforementioned action takes place depends upon the speed of the movement. If the speed be only slightly above normal (3-to-1) rebound might not occur, because of the lighter impact at G. The direction of arrow G would more nearly coincide with the direction of the slot. Also, the pin would be practically half way in the slot when contact occurs, thus stopping any tendency to rebound. However, there still is a sudden jar in any conventional movement when the speed has been increased beyond the 3-to-1 ratio, and the effects will be evident on both the parts and the film.

In this discussion, an intermittent in which the transfer of film is completed during a cam rotation of 90 degrees is termed a 3-to-1 movement. This same intermittent is sometimes spoken of as a 4-to-1 movement. This is apparently due to considering the ratio of the entire circle, 360 degrees, in relation to that part of the circle during which the pin is moving the star, or 90 degrees, which gives a ratio of 4 to 1.

The writer prefers to consider the ratio of that part of the cam rotation during which the star stands still, or 270 degrees, in relation to the part of the cam rotation during which the star moves, or 90 degrees, thus giving a ratio of 3-to-1.

In the extremely fast movement no bounce occurs when the pin leaves the slot, but a tendency to bounce

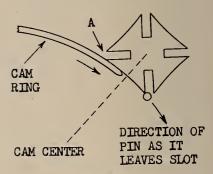
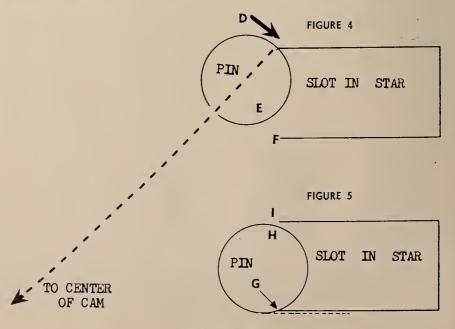


FIGURE 6

exists when the curved surface of the star contacts the lock ring—which may be quite serious. The pin will not completely stop the star, due to the same conditions which started the star so violently, as shown in Figs. 4 and 5.

Since the pin leaves the star before the star has stopped, the latter must be stopped some other way. Unless the film tension is abnormal, the point of the star strikes the cam ring at A, Fig. 6, and rebounds, causing the star and sprocket to turn backwards. This

(Continued on page 13)





AUDIO - VISUAL

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A-V Equipment Problems in the Education Field

ONE of the important sources of resistance to the use of pictorial techniques, especially the motion picture, is the trouble involved. This is not unique to pictorial techniques. Nobody can argue against the importance of laboratory and field trips in science, but a great deal of general science is taught without a laboratory and a very high proportion of biology is taught without any field trips at all. Anything that involves administration outside of the classroom is trouble.

If you are going to do anything more than reach for a book, you are going to run into difficulty—decisions, routines, and administrative action beyond the scope of individual teacher's authority. But in conjunction with properly designed schools, properly designed equipment cheap enough so that it could be available in each classroom, would go a long way toward solving these difficulties.

Vexing Equipment Problems

One of the important reasons why teachers do not make more use of films is that they run into so many frustrations in trying to use the equipment. It is hard to darken the room. Since there are not enough projectors, special arrangements have to be made to get one.

Although projectors have been improved, they still tend to be costly, noisy, heavy, and complicated. In many cases, the newer and better types of

†"Audio-Visual Communication Review," Vol. 5, No. 3, published by National Education Assoc., 1201 Sixteenth St., N.W., Washington, D.C.



Slides may be projected automatically in a lighted room with B. & H.'s new 750-watt Robomatic projector. Shown here with the Automatic Timer, which controls or varies the time each slide is shown, the Robomatic projects 2 x 2, Bantam, and Super slides. equipment have not been purchased. In other cases, the types of equipment which the teacher needs for educational use have not yet been produced.

Often what the teacher really needs is a number of short 30-second to five-minute bits of demonstration material which can be fitted into the context of a lesson. For example, in 30 seconds the motion picture can convey a better idea of the locomotion of the amoeba than can a much longer period of talking, drawing diagrams on the blackboard, or a laborious attempt to find and demonstrate to individual students an amoeba under a microscope.

Radically New Units Needed

The teacher not only needs to have these shorter specific films available, but he also needs to be able to utilize them effectively. In the average antiquated classroom no one is going to pull down the shades, turn out the lights, set up a projector and thread it, in order to show a two-minute film or filmstrip, then reverse this whole process, talk some more, and then go through the whole thing again.

We need to design and produce radically new kinds of equipment that will make use of the great potentialities of the motion picture and the filmstrip, but with the same facility and flexibility as the blackboard. In addition to making the graphic materials more efficient in teaching, we also need to make their use easier and more rewarding to the teacher. Specifically, some of the greatest needs are:

- 1. Better daylight screens.
- 2. A projector so designed that it can be operated without forcing the instructor either to leave the front of the room or to arrange for a separate projectionist.
- 3. A magazine-loading projector so that one can simply press a loaded film magazine into a slot and show a few minutes or seconds of film without a complicated threading and operating procedure.
- 4. The preparation of short clips or loops of films to allow for repetition, if desired.

A considerable amount of experimental work has already been done on devices to meet each of these needs. The further development of such devices and their adoption as standard equipment for the average classroom will enormously facilitate the use of graphic methods to improve teaching.

Manufacturer-Educator Link

Means should be found to keep equipment manufacturers in touch with the problems of the classroom so that they can get ideas about the real needs and possibilities. One way of doing this would be to set up a liaison working group under the joint sponsorship of the Society of Motion Picture and Television Engineers, the National Education Association, and the American Council on Education.

One outstanding case in which the needs of the field have generated a special piece of equipment occurred when the football coaches began to express some kind of organized opinion. The result was a silent motion picture projector with which one can scan frames backward and forward to analyze the details of action. In certain subjects, classroom teachers might find this projector useful if they were only made aware of its potentialities.

It seems highly likely that many other special types of equipment could be designed, profitably sold, and effectively used in education, if some farsighted way could be found to discover the special needs and to communicate these needs to the inventors and engineers.



Automatic exposure control by means of an electric eye, and automatic threading are features of the new Bell & Howell 240 EE 16-mm movie camera, said to be the world's first spool-load camera with the electric eye.

In the SPOTLIGHT

Unanimity Marks 44th Biennial IA Convention

TRANQUILITY was the keynote of the recent 44th Convention of the IATSE which was held at Kiel Auditorium, St. Louis, Aug. 4-7, and this factor applied to all business conducted, including the re-election of all officers for the ensuing two years. The roll call revealed the presence of 1,143 delegates representing 834 Locals and having a total of 1,211 votes, the disparity in figures reflecting fractional votes for some of the delegates.

The aforementioned unanimity of action did not signify a total lack of problems confronting the organization—in fact, there are several serious situations demanding immediate and sustained attention—but rather the realization on the part of the delegates of the drastic changes that are taking place in the entertainment field and also of the prevailing economic climate.

Unemployment a Prime Worry

Two of the major problems relate to mounting unemployment among projectionists and West Coast studio workers—a direct reflection of the sharp decline in production of theatrical feature films due to the determination of producers to concentrate on the so-called block-buster films which call for huge budgets and extended playing time at advanced prices in the large downtown houses in big cities.

There is no indication that this production trend will be reversed in the foreseeable future, thus these problems seem destined to increase in severity, rather than be ameliorated, with each passing month.

Tape Jurisdiction Issue

Another prime problem for the West Coast units (and for the IA as a whole) is the growing tendency of both independent and major-studio producers to make their pictures in foreign lands, which may involve the use of only two or three key technical personnel (including the boss cameraman) from Hollywood as contrasted with the several hundred who might have been used on the job here in America.

One area of immediate and long-term effort by the IA as a whole is that em-

bracing the meteoric rise of tape as a medium for recording and showing motion pictures (picture and sound) in all branches of the communications field which are manned by IA workers — theatrical, TV, industrial and educational. It had been expected that this issue would touch off a few oral fireworks on the convention floor, but it appeared that there had been an off-the-floor "meeting of minds" that served to restrict the remarks to a minimum.

This is not to imply that the matter itself was or will be minimized, because the personal report by President Richard F. Walsh discussed the development at some length, and in one passage therein he stated emphatically that the IA did not intend to be caught "napping" relative to tape as it was with the rapid spread of TV.

Anti-Labor Legislation

President Walsh also delivered a slashing attack on the current concerted move to pass anti-Labor legislation, national and state, with particular reference to "right-to-work" laws which already prevail in almost a score of states. He warned the delegates that they could ignore such legislative moves only at the risk of mortal peril to their organizations.

Two other resolutions were of keen interest to practically all the delegates—those relating to pensions for aged members, and the establishment of a home in some salubrious climate for members in the same category. These proposals involve large outlays of money, thus they were of necessity referred to the General Office for further study.

• A new provision in the New York State Penal Law makes it a crime for an employer to fail to pay, within 30 days, all sums which, under a collective agreement, may be due to health, welfare, severance, vacation, and retirement funds.

The lack of a legal time limit for making fund contributions, and the fact that there was not until now any punishment for failure to pay to such funds was a great temptation to some employers. Now the obligation to pay is equal to that of paying wages. Failure to pay, in one case or the other, is now punishable by fine or imprisonment, or both.

• It is not unusual for blood brothers to belong to the same Local Union of a given International, nor it is a rarity when both achieve executive positions therein. But we believe that the circumstances detailed in the following item are unprecedented in any Local, any International:

Recently Albert Storch was elected president of IA Local 366, Westchester County, N. Y., (stagehand unit), and a delegate to the IA 44th Convention which was held last month in St. Louis,





where he served on the President's Report Committee. He was also elected a delegate to his own 10th District, wherein he is a member of the Executive Board and the Resolutions Committee.

These are precisely the same offices and appointments held by his brother, the late Nathan Storch, who also worked as a projectionist and "broke in" his brother as a reel boy back in 1923. Like his brother, Al is a member of Westchester County Local 650, and is presently employed as projectionist at Loew's Mt. Vernon Theatre. He has been a member of the IA since 1927.

- The annual fall meeting of the New York State Association of Projectionists will be held on Monday, October 20, at the Lakewood Rod and Gun Club on Chataqua Lake, three miles out of Jamestown, N.Y., reached via Route 17J. Those who intend to be present should communicate immediately with George W. Samuelson, P.O. Box 153, Jamestown, N.Y.; if special accommodations (motel, etc.) are desired, so specify.
- Pen pal wanted. One of our overseas readers, Toru Baba, 3 Okan Cho Higashi-Ku, Nagoya-city, Japan, would like to correspond with an American projectionist for an exchange of ideas on projection techniques. Baba, 22 years old, works as projectionist in a movie theatre, and would particularly like to hear from craftsmen about his own age.

THE GENEVA MOVEMENT

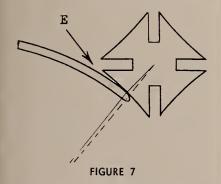
(Continued from page 10)

is more serious here, because no film tension alleviates the trouble.

While the star is turning clockwise, due to the rebound, the cam is also turning clockwise, so the second contact occurs when the end of the cam ring is somewhere between the position shown in Fig 6 and the dotted line. The end of the cam ring and the star are moving in opposite directions, resulting in a collision, and due to the position of the parts, a terrific wedging action takes place, tending to force the star and cam apart and also to bend the two shafts, causing high pressures between the journals and their bearings.

Figure 7 shows the parts at the second impact. The dotted line connects the shaft centers; solid lines are drawn from the star center to the point of impact, and from here to the cam center. The solid lines bend only slightly at the point of impact, being nearly in a straight line and causing extremely high pressures for an instant. A small opening exists at E, showing that the star has bounced and must again turn in the normal direction (counterclockwise) to close it.

When this gap has again closed, the end of the cam ring has moved past the dotted line, and the star is locked



in position. Such a movement undergoes a severe beating, and failure is only a matter of time. Of course, this treatment does the film no good: a few times through the machine causes checked sprocket holes, and complete failure soon follows.

A faster film transfer may be accomplished in other ways. Although results are similar, the parts and the film last longer. In effect, it is as though the projector speeds up—say, to 180 feet per minute—while the film is pulled down. The projector then slows down below 90 feet per minute and runs at this speed until the next film transfer. Actually, the projector runs at 90 feet, but the cam is accelerated when about to move the star, and again decelerated at the completion of the star movement.

[TO BE CONTINUED]



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Today, it's B&L all the way. Most of the movies you show are filmed with B&L lenses. To show them at their best, more and more indoor and drive-in theatres are standardizing on B&L projection optical systems. It'll pay you to find out why.





LETTERS TO THE EDITOR

In Again, Out Again

To the Editor of IP:

This focus problem, as discussed by Willy Borberg in his article "Gate and Shutter Characteristics" in IP for June last (p. 14):

While running down the leader of a new Universal newsreel trade-mark there appeared a film flutter at the framing aperture (don't, please, blame this upon the upper loop) of a Simplex X-L which, as you know, has a flat projector gate. Naturally, each time this occurred there appeared an image on the screen which could only be described as "focus flutter".

Intermittent at Fault?

Proper procedure dictated that I observe the position of the intermittent sprocket each time the film frame at the aperture moved away from the "zero" position. This tricky flutter seems to be prevalent in Universal newsreel prints when the projector motor is turned on and off, which allows the mechanism to "coast" until the eye can discern the film frame moving away from "zero" position and at the same time note the position of the intermittent sprocket.

Evidently, on the pull-down the film would go quickly to zero-plane flatness—or beyond to a negative buckle and, then, just as fast to a positive buckle after the intermittent sprocket just finished its travel.

I believe that the film inertia between the perforation edges (illustrated beautifully by Borberg in Fig. 3, IP for June, p. 14) could be attributed to the present design of the intermittent sprocket. Weak film, misalignment of perforations, and hold-back friction are major contributing factors.

WILLIAM PALUMBO Niagara Falls, N. Y.

NOTE: The film-buckling effect observed by Mr. Palumbo at the framing aperture of his X-L's when "running down" leaders is not the same as the heat-induced film flutter studied and described by Borberg in the article titled "Gate and Shutter Characteristics." This writer has often observed the film to "snapin-and-out" over the aperture when running down by hand.

But subsequent examination of the film always revealed the presence of some degree of "warp" caused by film-flute (middle of film shrunk more than edges) or permanent buckle (shrunk perforation margins).

This Business of 'Fluting'

Fluting of new prints is usually caused by loose winding of the freshly-processed rolls exposed to dry air at excessively high temperatures. This is likely to occur in the drying cabinets of high-speed processing machines. When fresh film is wound loosely emulsion-side "in," and subjected to dry air, the undulations of film-flute alternate from one edge to the other; if the film be wound emulsion-side "out," the undulations are directly opposite one another. (See Mitchell's Manual of Practical Projection, pp. 19—22.)

Both flute and buckle result in focus-flutter when the film is projected, but the effect is somewhat independent of the shutter-caused rapid flashes of radiant heat which have been so skilfully measured by Borberg, and which produce a blurring of the focus even with prints free from deformation.

The strain patterns in film postulated by Borberg appear very reasonable, considering that the film is pulled down through the gate by its edges. Strains of this character are produced in all film, of course; but the presence of flute and buckle deformations would induce such structural strains to force the middle of the film "in" or "out" during the time of maximum pulldown velocity.

The middle of the frames do not necessarily return to their original positions when the pulldown-force is removed. In the case of undeformed film, the effects of heat-induced expansion and contraction of the emulsion appear to be almost completely independent of any strains present in the film base during the actual intermittent pulldown.

Intermittent Absolved

We do not believe that the "design" of the intermittent sprocket, per se, can be blamed for film flutter, inasmuch as the same flutter

effects are in evidence when claw movements without auxiliary registration pins are used in place of geneva sprocket movements.

Holdback friction (gate tension) is surely an important factor in the production of mechanical instability of film positioning over the aperture, as Mr. Palumbo points out. There is no evidence, however, that the raw-stock manufacturers ever issue film having misaligned or otherwise faulty perforations.

OBITUARIES

LORENTZ, ALBERT E., 64, and IRVIN TURNER, 61, both veteran members of Local 171, Pittsburgh, Penna., died within a few weeks of each other. Lorentz, who died after a short illness on August 17 last, was a member of the Local for 43 years and for the past 20 years was a projectionist at the United Artists Penn Theatre (formerly Loew's Penn Theatre).

Turner, a member of the Local for 25 years, drowned in Deep Creek Lake (Md.) where he was spending his vacation.

DOERR, CHARLES, member of Toronto Local 173, and projectionist at the Paramount Film Exchange for the past 37 years, died suddenly last July 17.

Mulcahy, William, J., 79, retired member of St. Louis Local 143, died last month. A member of the Local for 48 years, Mulcahy worked in a number of St. Louis theatres until his retirement in 1945. He is survived by his son, James W. Mulcahy, also a member of Local 143.

Sands, Mort J., veteran member of Los Angeles Local 150, died August 1 last. A staunch unionist, Sands served the Local in many official capacities. For 25 years he held the office of secretary-treasurer, resigning in 1944. He served as vice-president in 1949-50; was chairman of the board of trustees in 1953; and in 1957 was elected president, which office he held at the time of his death. For many years he represented Local 150 as delegate to the Los Angeles Central Labor Council, State Federation of Labor, and IA Conventions.

The Pedagogues, Too

The information contained in this Manual of Practical Projection, by Robert A. Mitchell, will be of great use to those of us who administer or operate audio-visual programs. Serious students of projection problems . . . will find much useful information.

JAMES D. FINN Professor, Audio-Visual Instruction University of Southern California

See back cover.

TORONTO LOCAL UNION RETIREMENT PLAN

(Continued from page 6)

to further increase the pension. This pension is payable by monthly instalments for a period of 5 years certain, and so long thereafter as the pensioner shall live.

Joint Pension With Beneficiary

At any time before Normal Pension Age an employee may elect to take on retirement at Normal Pension Age a smaller pension payable during the joint lifetime of the employee and a nominated beneficiary. This pension would not be payable for any minimum period, but would continue in full until the death of the survivor.

Contributions

The annual rates of contributions are as follows:

The Employer will contribute an amount equal to 5% of the employee's salary; the employee will also contribute 5% of his salary.

[Notes: 1. For the purposes of this Plan, "Salary" means Annual Earnings exclusive of any payments for overtime, bonuses, and gifts.

2. Member's contributions will be deducted from his salary weekly, semimonthly, or monthly, as the case may be.]

Additional Contributions

... to increase his pension an employee may on any anniversary of the Commencement Date voluntarily undertake to make regular contributions until Normal Pension Plan, according to the following table, is operative—provided that the employee's total contributions do not exceed \$1500 in any calendar year.

Years to Normal Pension Age from Date of Joining Plan	Maximum Rate of Additional Contribu- tions % of Salary
20 and under	10
21 - 25	6
26 - 30	4
31 - 35	2.5
36 • 40	1.0

[Note: The rate of additional contribution is determined by the years to Normal Pension Age on the date the employee is enrolled in the Plan, irrespective of the date on which he commences to make additional contributions.]

Income Tax Relief

Under present Income Tax Regulations, contributions of employees as defined herein may be deducted from gross income, within the statutory limits, to determine taxable income.

Death Benefit

An employee may name a beneficiary to receive the amount payable in the event of his death, and will be permitted to change the beneficiary from time to time, provided there is no statutory restriction. If a beneficiary has not been nominated, or if the nominated beneficiary predeceases the employee, any payment due under the Plan will be made to the employee's estate.

The amount payable in the event of an employee's death shall be in accordance with the following:

Death Before Retirement on Pension:

If an employee dies while in the service of the Employer and before retirement on pension, a return will be made of the *whole* of the employee's and the Employer's contributions, with compound interest.

Death After Pension Payments Have Commenced:

If a pensioner dies before receiving the total number of instalments guaranteed, payments will be continued until the end of the *guaranteed* period and shall then cease.

Settlement Options

The employee (or, after the employee's death, his spouse or dependent being the nominated beneficiary) may elect that settlement be made in respect of the amount payable in the event of his death before retirement on pension, in accordance with one of the following options:

(a) in a lump sum; or



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(b) as a life pension with or without a guaranteed period. The guaranteed period shall not exceed 10 years; or

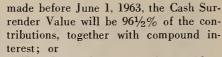
(c) in instalments over a period not exceeding 10 years. This option is only available to a beneficiary who is the employee's spouse or dependent.

Any payment made to the employee's estate or to a nominated beneficiary who is not the employee's spouse or dependent will be made in a lump sum; unless the employee elected that settlement be made to such beneficiary in accordance with option (b) aforementioned.

Withdrawal

If an employee ceases to be a member of the Union before the pension is payable, the following options will be available to the employee, subject to a decision being intimated to the Assurance Company within 30 days. If such intimation is not received, the employee will be deemed to have selected option (a).

(a) The employee may take the Cash Surrender Value of both his and the Employer's contributions made on his behalf. In respect of all contributions



(b) The employee may take a paid-up pension at Normal Pension Age for the amount secured by his and the Employer's past contributions.

Interest

Interest payable under the Plan in respect of contributions will be calculated from the end of each year of payment of contributions and will be compounded annually. For contributions made prior to June 1, 1963, interest will be calculated at the rate of 3%.

Temporary Absence

If an employee is temporarily absent from active duty but is receiving full remuneration from the Employer, his contributions will be deducted in the usual way.

If an employee is temporarily absent from active duty but is not receiving full remuneration, then contributions may be discontinued during absence, and a corresponding adjustment made in the pension credited.

Provision of Benefits

The Union accepts its obligations under the Plan and in order to provide the foregoing benefits will apply the employee's and the Employer's contributions under a Group Pension Policy with The Standard Life Assurance Company, and the policy may be seen at the offices of the Union on application.

The Union will hold in trust for the benefit of employees the group pension policy. The Union's liability will be limited to the amounts paid by the Assurance Company, corresponding to the employee's benefits and options under the Plan.

Each employee will receive a signed





TABLE OF PENSIONS: NORMAL PENSION AGE

	Pension Assumed at Normal		Pension Assumed at Normal
Age Next Birthday	Pension Age 70	Age Next Birthday	Pension Age 70
20	\$1590.13	45	\$434.18
21	1519.21	46	407.44
22	1450.72	47	381.73
23	1384.93	48	357.04
24	1321.64	49	333.29
25	1261.03	50	310.46
26	1202.55	51	288.48
27	1146.37	52	267.38
28	1092.32	53	247.05
· 29	1040.24	54	227.52
30	990.24	55	208.76
31	942.16	56	190.71
32	895.86	57	173.35
33	851.42	58	156.66
34	808.68	59	140.61
35	767.53	60	125.18
36	728.00	61	110.34
37	689.98	62	96.07
38	653.48	63	82.35
39	618.39	64	69.16
40	584.61	65	56.47
41	552.14	66	44.27
42	520.89	67	32.55
43	490.86	68	21.28
44	461.96	69	10.43

certificate of membership in the Plan.

Assignment

The benefits and options under this Plan are unassignable, whether by voluntary action or by operation of law.

The accompanying table sets forth the amounts of pension for male employees at Normal Pension Age 70 secured by an annual contribution of \$100 (\$50 by the Employee and \$50 by the Employer)—assuming the continuance in force of the rates which are initially guaranteed for contributions made prior to June 1, 1958. The pension secured by other amounts of contribution would be in exact proportion. Pension amounts on retirement other than at age 70 will be quoted, as required.

MIDGET MICROPHONE, by RCA, for TV and movie-sound pickups is a new type (electrostatically uniangular) that measures, in inches, 1½ in diameter and 3 long, and is extremely light in weight (3 oz. compared with 4½ lbs. for old pickup). New mike also is much more sensitive than old models.

Soundproofing airflow is being investigated by Armour Research Foundation. Noting that forcing air through perforated, acoustical ceiling tile deadens sound, researchers conclude that acoustic resistance due to airflow is created by conversion of sound energy to heat energy at ends of holes. Possibility is that acoustic principle can be applied to auto mufflers, air-duct silencers, sound traps for home air-conditioners, jet-engine test cells.

SHUTTER FLICKER

(Continued from page 9)

faction that the blades of cylindrical shutters are not adjustable in width. (Neither are the blades of conical shutters, hence the manufacturers of both types supply alternate widths for regular and drive-in use.)

Adjustment of Blade Width

The blades of disk-type shutters should be narrowed down to the point where travel-ghost just begins to appear on both the tops and bottoms of the white letters in a plain title or test film when the shutter is correctly "timed." The blades should then be widened to the point where the ghost just disappears, and then, for safety's sake, widened just a bit more.

In no instance, however, should the blades of 2-blade shutters be less than 90 degrees in angular width when 3-to-1 intermittent movements are used, or less than 60 degrees when 5-to-1 movements are used. In fact, these theoretical minimum blade-widths cannot be employed with high light levels because of the time it takes for the shutter blade to cut all the way through the light beam.

In theatres having optically fast lamps and rather bright pictures, the width of the blades of single-disk rear shutters is usually from 99 degrees (45% transmission) to 108 degrees (40% transmission) in order to eliminate all traces of travel-ghost and the "trembly" effect of insufficient blade width.

Travel-Ghost Factors

The theoretical maximum light transmission of 50% (90° blades) can be very closely approached with all types of double-acting shutter. The use of 5-to-1 intermittents (an exclusive optional feature of the Simplex X-L) permits, in practice, up to 63.9% transmission (65° blades), which is very close to the theoretical maximum of 66.7% transmission (60° blades).



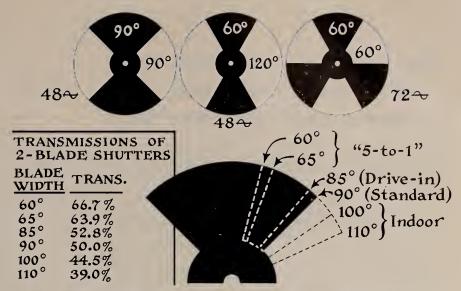


FIGURE 3. Blade-configurations and light transmissions of different types of projector shutters in general use.

The blades of projector shutters require widening as the gears and their shafts and bearings become worn. If no allowance is made for "hunting" of the shutter, streaks of travel-ghost may flare at intervals from the edges of bright objects in the projected pictures. Moreover, sudden accelerations and decelerations in the rotation of the shutter produce transient fits of flickering. This effect was more common in the days of silent pictures, when projectors were often cranked by hand, than at the present time with constant-speed drive motors.

"Timing" the Shutter

Incorrect shutter adjustment causes travel-ghost even when the shutter has blades of adequate width, and when the gears and bearings are in perfect condition. A shutter that cuts the light beam a fraction of a second too soon produces ghosts on the bottom edges of highlight areas; while a shutter that acts a moment too late produces ghosts on the top edges of such areas. These troublesome ghosts, best seen by the projectionist when the glass is temporarily removed from the observation ports, are summarily exorcised by the

simple operation of shutter timing, familiar to all projectionists.*

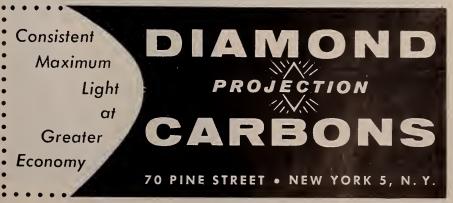
"Beat" Flicker

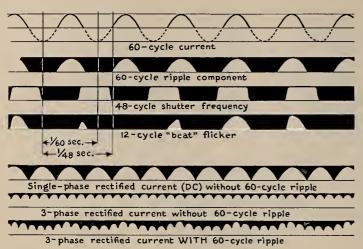
Only when ghosts appear on both the tops and bottoms of bright objects, either alternately ("hunting" caused by gear backlash) or simultaneously, may the projectionist be sure that his shutter blades are several degrees too narrow.

A very common shutter factor causing objectionable low-frequency flicker is

* For a complete discussion of the practical details of shutter adjustment, see Chapter 7 of "Mitchell's Manual of Practical Projection."







Grophic representation of the phenomenon of current ripple and shutter action, with porticular reference to the production of 12-cycle flicker by 60-cycle ripple in rectifier output current.

FIGURE 4

ripple in the direct current supplied to the arclamps. Even though the frequency of both the arc-current ripple and the shutter action are singly too high to be visible, both together interact to produce arithmetical-difference "beat frequencies" which are readily perceptible when the ripple factor exceeds three or four per cent of the total arc voltage.

When a 60-cycle ripple is present in the arc current and a 48-cycle shutter cutoff is employed, the visible beat frequency is 60 — 48 = 12 cycles. With a 72-cycle (3 blade) shutter, the beat frequency is also 12 cycles (72 — 60), but not so pronounced (Fig. 3).

Users of motor-generator sets are free from the beat-frequency trouble which occasionaly afflicts screens illuminated via rectifiers. Arc-current ripple may, of course, originate either in the supplied alternating current or in the rectifier itself.

When the rectifier is at fault, the output for one or two of the three phases may be abnormally low because of a defective rectifying unit. This is especially true in the case of tube-type rectifiers.

Selenium stack-type rectifiers have remarkably uniform output characteristics throughout their useful life; and it is worth noting that the units incorporated into these rectifiers are equalized for output at the time of their manufacture to provide a long period of trouble-free service.

The presence of "beat" flicker when this type of rectifier is used nearly always indicates ripple in the supplied AC. This can usually be corrected at

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the mains output-transformer taps by the power company. A check on the voltage of each of the three AC phases should be maintained by the installation of three AC voltmeters of proper voltage rating.

Motiograph's New Hi-Fi In-Car Speaker

High-fidelity sound is promised in the new plastic in-car speaker just developed by Motiograph, Inc. The rugged, shock-proof construction resists breaking, chipping and denting of the handsomely-designed housing, assures long service and lasting beauty. It is designed to withstand rough handling and abuse that would quickly incapacitate and destroy the appearance of a die-cast aluminum housing. The finish of the new speaker is unaffected by sun, rain, snow or high or low temperature.

Measuring in inches but 6½ high by 4 wide and only 2¾ deep, the speaker is equipped with a convenient handle for ease of handling. The hanger is shaped to fit practically all makes and models of junction boxes. The black individual volume control on the front



New Motiograph Hi-Fi Speoker

From the Fountainhead

The following is verbatim from the report of the U. S. Department of Commerce:

"MOTION PICTURE INDUSTRY: The box-office take for 1958 compares favorably with the 1957 trends. An encouraging factor to offset competition from TV is the continued growth in production of feature films by independent film companies. While there was a decline in the last quarter of 1957, attendance for the full year at motion picture theatres is estimated at about the 1956 level. Increased admission prices should account for a small increase in 1957 gross box-office receipts. Average weekly attendance in 1957 is estimated at about 45 or 46 million, and gross receipts should approximate \$1,300,000,000. Attendance in 1958 should continue at about the 1957 level; however, a slight increase in theatre receipts is estimated because of higher admission prices.

"The foreign market for United States films continues to expand, and remittances from abroad in 1957 have been estimated at about \$210,000,000 to \$220,000,000. Barring unforeseen difficulties 1958 should maintain this level."

is instantly located against the buff-colored case.

This new speaker is being offered in two models, one with a conventional speaker unit and one with the Motiograph Rainmaster unit. The face of the Rainmaster unit is covered by taut linen which is impregnated with a chemical that prevents water, grit and dust from reaching the cone of the speaker unit.

Both models, moderately priced, are now available at all Motiograph dealers. Details from Motiograph, Inc., 4441 West Lake Street, Chicago 24, Ill.

PERSONAL NOTES

RICHARD H. POLLOCK, sales supervisor of the Atlanta district of du Pont Photo Products department, will be manager of that department's Trade Analysis section in Wilmington, Delaware. He succeeds Stephen E. Magill, who has been transferred to the Los Angeles district as technical representative for industrial products.

Norwood L. Simmons, chief engineer of the West Coast division of Eastman Kodak's motion picture film department, has been named assistant manager of the division. The division offers technical service to professional motion picture studio customers. Simmons is also executive vice-president of SMPTE.

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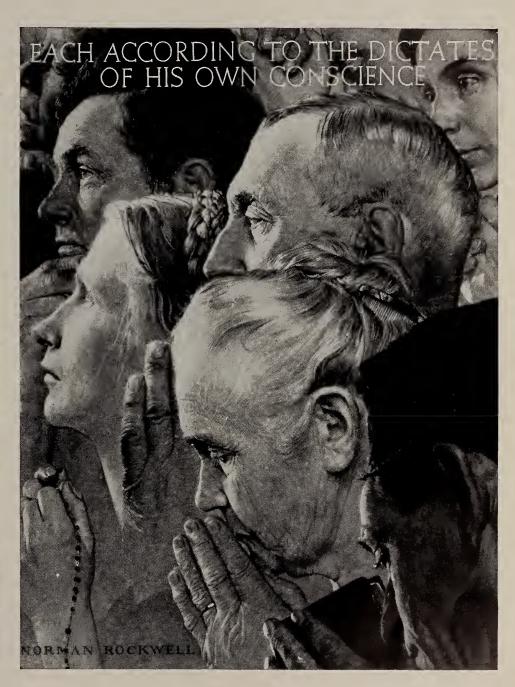
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Miscellaneous Items—News Notes—Technical Hints

Monthly Chat

Pot-Pourri: Diffusive Reflections

NE of our fellows, director of projection for a string of important theatres and the proud overseer of one of the finest machine shops we have seen, has developed a curved gate for the Simplex E-7 projector. Even the Simplex X-L mechanism was without such advantage until six years after its introduction in 1950. The hundreds of E-7's in operation could be greatly improved by this addition. IP will supply the name of the maker of this gate upon request—just to see how attentive the class is.

ELSEWHERE herein an article relative to projection processes at the current Brussels World's Fair which offers convincing evidence that European producers really think of the motion picture as an art form rather than as a doorway into a drawing room or boudoir where stilted flippancies are offered to a tabloid-conscious audience. . . . Says Josh Logan, director of "South Pacific" in both its stage and filmed versions: "I found that I could actually heighten the sense of intimacy on film (Todd-AO) that I achieved on the stage." . . . Metro-Goldwyn-Mayer reports that the total income derived from the sale of its film backlog to TV since 1946 is \$53 million! . . . Paramount, now busily engaged in a world-wide effort to spread the gospel of "unlimited faith" in the "continuance" of the theatre field, issues its manifestos while reclining on a cushion of \$50 million from TV. 20th-Fox? Well, its prexy Spyros Skouras almost daily makes a confession of his "unbounded faith" in the film theatre to which is appended in true orthodox fashion an act of contrition that the sale of film features to TV was "a tragic mistake." This concern for the poor exhibitor would seem to be akin to that of the wolf for the lamb, the shark for the trout. . . . Speculative note: the supply of feature films still available to TV stations is running very low, so fast do the networks chew them up. Next stop? Maybe another dip into the movie company vaults for film produced in the five years up to 1953? Could be. . . . Don't miss the latest Science Series program by Bell Telephone Labs., "Gateways to the Mind," to be TV'd in color over the NBC network Thursday evening, October 23. It shows how the human senses are the means through which man maintains his contact with the world about him. Great stuff.

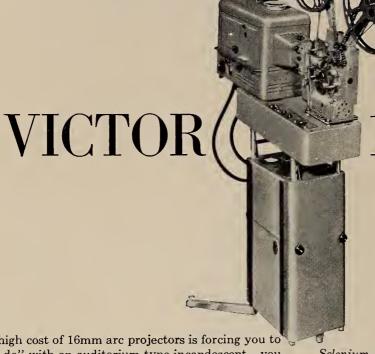
IP's Expanded Non-Theatrical Section

EVEN A RIFFLE through this issue of IP will disclose the expansion of the non-theatrical A-V section which, eschewing pedantic views anent curricula or procedural methods, will concentrate on the proper selection, operation and maintenance of all equipment used to communicate intelligence: projectors, motion pictures, slides, filmstrips, optics, power sources—the list grows long and still is far from complete—which render more effective a given presentation.

It is not for IP to assay the practical worth of this effort. Of more than passing import, however, is the statement that our Service Bureau will be headed by Joseph Holt, a veteran audio-visual practitioner in both the professional and non-theatrical fields, who stands ready to serve those requesting technical data so as to extend their impact upon and influence in this specialized field of endeavor. We ask only that our growing list of A-V subscribers utilize to the full his services.

-James J. Finn.

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1600 ARC

If the high cost of 16mm arc projectors is forcing you to "make do" with an auditorium-type incandescent—you owe it to yourself to consider the Victor 1600 Arc. It delivers a full 1600 lumens of light on the screen at 30 amps with Mark II Shutter—more than three times that of any incandescent—yet it's still easier on your budget than other 16mm arcs. It incorporates all advanced Victor projector features and a powerful 25-watt amplifier. The 1600 Arc runs for a full hour on one set of carbons, does not require a special projection booth, and is the only arc projector made with 3-case portability.

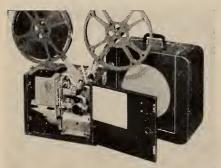
SPECIFICATIONS:

Selenium Rectifier has top-mounted controls, swingout legs, built-in tilt lock, is blower cooled. Also serves as base for projector.

Speaker case houses 12" bass reflex speaker and is carrying case for 25-watt amplifier-projector unit.

Lamphouse has built-in ammeter with motor rheostat, automatic carbon feed, external arc position marker.

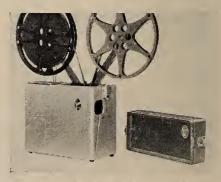
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INTERNATIONAL PROJECTIONIST

Volume 33 OCTOBER 1958 Number 10

Image Contrast and Picture Quality

By ROBERT A. MITCHELL

The sum total of all effort, from conception of an idea on through scripting, production and showing, is contained within an area of fragile material so small as to be expressed in terms of millimeters. The content of this area, and its proper presentation for viewing, is detailed in the appended analysis.

SATISFACTORY theatre projection, we know, is confined to the narrow range of maximum ("no-film") screen brightnesses between 10 and 30 foot-lamberts (ft-L) measured with the projector shutter running. Unfortunately, it is quite difficult to attain even the minimum recommended brightness of 9 ft-L in large drive-in theatres, but light levels on gigantic screens have been raised to the range of comfortable viewing by such modern extra-

powerful HI arclamps as the Ashcraft Super Cinex, the Strong U-H-I and Constellation, and the revolutionary new Strong Jetarc and National Ventarc lamps.

A vitally important factor affecting viewing ease and pictorial naturalness is *image contrast*. This is a subject that will lead us all the way from lenses and port glass to the mysteries of film "gamma."

Meaning of "Contrast"

The word "contrast" implies differences existing between two or more things—differences which are readily apparent. Image contrast involves the scale of brightnesses which constitute the picture itself. These brightnesses range from brilliant white—the screen brightness resulting from the clearest highlights on the film—through the light grays, the medium grays, and

the dark grays to black, the absence of screen illumination.*

The source of image contrast in the picture on the screen is, of course, the photographic contrast of the picture on the film. Remember, if it isn't on the film, it can't be on the screen! Unlike a TV receiver, which allows us to increase or decrease the contrast of the reproduced picture by adjusting the amplitude of the video signal, a motion-picture projector cannot supply to the projected picture a degree of contrast greater than that present in the film photographs. A "thin," washed-out picture on the film produces a similarly washed-out screen image.

So, even though we cannot increase the contrast of projected pictures beyond the degree present in the film, a number of factors may enter into the projection process to *reduce* image contrast. Reduction of contrast is *always* undesirable in projection be-

cause it diminishes the visibility of the fainter details of the picture, especially in shadow areas of low luminance, and gives the picture a dim, foggy appearance.

Contrast-Reducing Factors

Here are some of the contrast-reducing factors we wish to avoid: spilllight on the screen, dirty lenses and port glasses, and screens of the wrong type.

Spill-light is often a serious problem in modern theatres. The auditorium lighting during projection is too bright, and some of the extraneous light is inevitably reflected from the walls to the screen. The deeper shadows in the picture thus wash out to a uniform dark gray or brownish gray, depending on the color of the "run lighting." Pictorial detail in the shadow areas is lost to view even though it exists on the film.

With the bad effects of spill light in mind, we should not depend upon bright wall or ceiling lamps to supply the necessary auditorium illumination during the show. Aisle lights of adequate power permit patrons to find their way about after the main house lights have been turned off. Besides, considerable light is reflected from the screen; and this helps the patrons find their way. Not only do movies look better when the screen is shielded from stray light, but a reasonably dark house is a psychological advantage.

The writer has long advocated the use of matte (plain white) screens in most theatres because they give a finer picture with better pictorial detail and superior light distribution. The new "pearlized" screens, both plain and embossed with tiny light-directing len-

^{*} Even the blackest areas in normal release prints transmit *some* light about (1%), as we shall later see.

ticules, are even better than ordinary white screens!

Except in the long, narrow theatres where they are definitely advantageous, aluminum screens are too directional, too low in overall reflecting power, and too coarse in surface texture to give a smooth-looking picture. The more highly directional aluminized screens are characterized by pictures which are glaring as seen from the middle of the auditorium, too dark as seen from the sides, afflicted with a "hot spot" which changes its location with that of the observer, and coarsegrained from all points of view.

Aluminum Screens for Contrast

In one respect, however, aluminized screens give superior results. They preserve better than most other types the full range of photographic contrast of the film pictures, whereas matte screens, especially in theatres having light-colored auditorium walls and too much run lighting, tend to "soften" contrast by reducing it.

The reason for this is easy to understand. Aluminum screens are directional, and are set up to direct the light from the projectors into the auditorium viewing area. Consequently, spill-light from each side of the auditorium bounces off the aluminized surface mirrorwise to the opposite side, and does not reach the eyes of the audience. Black areas in the picture thus remain black, uncontaminated by extraneous light. Matte screens, on the other hand, reflect all light in all directions, combining the light from all sources in a simple additive way.

Most screen manufacturers clearly emphasize the high reflecting powers of their screens. Matte screens which reflect 80%—90% of the incident illumination give pictures twice as bright as those reflecting only 40%—45% of the light. Because there is no light to spare in most theatres, high-reflectance screens are installed; it would be folly to do otherwise. Yet, gray screens—screens reflecting, say, only 20 or 25% of the light falling upon them—increase contrast in the presence of spill-light and make the blacks in the projected pictures look blacker!

The gray projection screen is analogous to a TV receiver having a dark neutral-tinted glass in front of the picture tube. Although out of the question in regular theatres, gray screens

give excellent results in small preview rooms where picture size is so small that adequate brightness is no problem

Film processors are well aware of the contrast-reducing effects unavoidably present in the projection process. Even the cleanest lenses and darkest auditoriums reduce contrast to a slight degree. Processors therefore make the picture contrast on the film greater than normal for a better-looking picture.

Contrast of the picture on the film is a matter closely associated with emulsion characteristics and photographic development, and is controlled during the processing of the negative or intermediate films because development of the release prints is a standardized "mass-production" procedure which allows no variation for individual rolls of film.

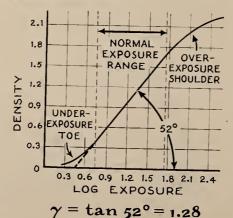
Photographic Gamma

Even the adjustment of printer lights, controlling the overall brightness of individual scenes, is nowadays done during the printing of the master positives from which the duplicate negatives are made. The release positives may then be "ground out like sausages" from the "dupes" in fully automatic printers and processing machines.

Cameramen and laboratory technicians have a special term for the contrast characteristics of a finished photographic image. This term is "gam-

FIG. 1. A "Hurter and Driffield" curve illustrating graphically the exposure and contrast characteristics of a developed film emulsion. As the exposures are increased, picture densities increase in direct proportion (except in the under-exposure "toe" and the over-exposure "shoulder").

The tangent of the angle formed by the straight slope and the horizontal exposure axis constitutes the "gamma" (γ) , or photographic contrast factor.



ma" (the name of a Greek letter which looks like this: γ), which may be understood by referring to Fig. 1, which shows the "Hurter and Driffield curve" of a developed photographic emulsion

An H & D curve relates image densities to the logarithms of the exposures necessary to produce them. (Logarithms are exponents of 10, hence the "log exposures" 0.3, 0.6, 0.9, 1.2, etc., in the diagram may be regarded as equal to 2, 4, 8, 16, etc., luminous intensities, such as footcandles, doubling at each step.)

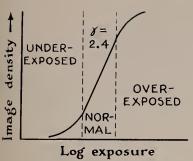
The straight-line portion of the curve constitutes the region of normal exposure, while the curved "toe" and "shoulder" the useless regions of under-exposure and over-exposure, respectively. Now, the tangent of the angle* formed at the intersection of the straight-line slope with the long exposure axis is the gamma value of this particular emulsion.

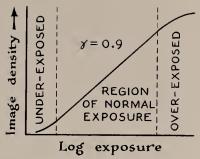
Figure 2 shows the H & D curves for a "contrasty" positive emulsion and a "soft" negative emulsion. Note that the straight-line slope of the positive-emulsion curve is steeper than that of the negative-emulsion curve. The positive emulsion thus has greater contrast—a higher gamma—than the negative emulsion.

Because the straight negative slope, less steep, covers a greater range of exposures, the negative emulsion has greater "latitude," and records pictorial detail in shadows too dark and in highlights too bright to record satisfactorily on the more contrasty film.

Negative images, therefore, appear rather "thin" and light, while correct tonal values are restored and somewhat enhanced in contrast by printing the negatives on contrasty positive film. But positive film would give poor results if used in a camera as a negative unless a special low-contrast developer be used to develop the exposed film. Such a developer reduces the gamma of the film and increases the photographic latitude. (It is also possible to reduce the gamma of contrasty film by "flashing" it with blank

^{*} A "tangent" is a trigonometric function which expresses the ratio of the lengths of two of the sides of a right triangle. The tangent of an angle is accordingly defined as the quotient of the side opposite the angle divided by the adjacent side. The numerical values of tangents are given in trigonometric tables.





"CONTRASTY" EMULSION

"SOFT" EMULSION

FIG. 2. H & D curves for two developed emulsions, one being very "contrasty" and the other slightly "thin." Note that the region of normal exposure is more restricted in the contrasty emulsion. This tends to "block" the shadow detail of a picture and "burn out" the highlight detail—a "soot and whitewash" effect.

The softer emulsion, on the other hand, records pictorial detail in both shadows and highlights, even though the resulting picture may look somewhat thin. Positive emulsions are "contrasty"; negative emulsions are "soft."

light previous to exposure in a camera.)

It happens that approximately correct rendition of the light and dark tones of the original scene is obtained when "overall gamma" (negative gamma multiplied by positive gamma) has a value close to 1.

Gamma Control in Processing

As a matter of fact, soundtracks give the best results when their overall gamma is 1 or just a trifle greater, but, as stated previously, lab men know that some of the picture contrast is lost in projection. Not only that, but a slightly contrasty picture looks best on the screen! Overall picture gamma, therefore, must be considerably greater than 1.

Contrast was occasionally overdone in the days of silent pictures, giving a "soot-and-whitewash" effect; but on the whole the pictorial quality of the silent films was superb. The quality of the photographic images was determined by the visual judgment of skilled laboratory craftsmen who knew nothing about gamma control, but who nevertheless produced images that were works of art—more beautiful, even if less "natural," than the run-of-the-mill pictures of today.

To compensate for the electrical losses in amplifying systems, sound-tracks are usually developed to an overall gamma of 1.08 instead of an even 1. Overall picture gamma, however, should be about 1.40 for a good-looking image. Since picture negatives have a gamma of approximately 0.65, which is decidedly "thin," the positive gamma must be 2.15.

1.40 (overall
$$\gamma$$
)/0.65 (neg. γ)=2.15 (pos. γ).

A positive gamma of about 2.15 requires the soundtrack negative to be developed to a gamma of 0.50 to give the desired overall soundtrack gamma of 1.08.

1.08 (overall
$$\gamma$$
)/2.15 (pos. γ)=0.50 (neg. γ).

Developers and development times are tested to give the correct gammas with test-exposure films called Cinex strips.

The matter of contrast control, simple for black-and-white negatives and positives, is quite complex in the case of color films. Areas of different color which might photograph as the same tone of gray on b-&-w panchromatic negative are readily distinguishable on color prints because of "color contrast." As a rule, therefore, color films require less tonal contrast—a lower overall gamma—although the difference between positive and negative gammas is ordinarily not so great as in b-&-w work.

Color-film exposures, both in photography and printing, must be confined to the straightline portions of the H & D curves to give consistent color from the highlights to the lowlights. All three emulsions (red-, green-, and blue-recording) must be developed to the same gamma for the same reason, although in practice the blue emulsion (printed in lemon-yellow dye) is given a bit more contrast than the red and green emulsions (printed in cyan and magenta, respectively).

Lens Cleanliness Important

The topic of gamma is well worth a moment's study even though few pro-

jectionists photograph and process theatre films. But now we go to a simpler, though equally important, matter, viz., the use of antireflection-coated lenses in our projectors and the cleanliness of the lenses (including anamorphic attachments for CinemaScope) and the port glasses through which the image-forming beams must pass.

Coated lenses not only give a brighter picture on the screen (sometimes more than 20% brighter) but also preserve the photographic contrast of the film pictures by keeping the dark areas really dark while increasing the brilliance of the highlights. The multiple reflections from the uncoated surfaces of old-style lenses literally drown out fine shadow detail and rob the picture of "snap."

Why bother to clean the lenses if the port glasses are allowed to remain dirty? The light must pass through both; and dirty port glasses have the same adverse effect upon the projected picture as dirty lenses. Clean both with equal care and by the same methods.

Only good quality optical plate, colorless and fault-free, should be used in the projector ports. This may be antireflection-coated for slightly greater light transmission, but because only two surfaces are involved, the extremely high cost of coated glass may not be considered a worthwhile expenditure.

Every projectionist has his own lenscleaning routine, but the general triedand-tested rules bear repeating. Dust is *gently* removed with a soft camel'shair brush, and fingermarks and oilfog washed off by careful swabbing with dilute soap solution followed by a pure-water rinse and gentle polishing in a circular motion with a clean cotton cloth or lens tissue.

Do not rub a dry lens with cloth or tissue, but first breathe on the glass to form a film of moisture. Avoid alcohol—it has to be chemically pure to take off more dirt than it puts on. Avoid vigorous rubbing and too-frequent cleaning.

Effects of Spill-Light

Extraneous light falling upon a motion-picture screen reduces the contrast of the projected picture. In fact, the effects of spill-light may be calculated by simple addition—projection light plus spill-light, both specified in ft-L's of apparent brightness.

If two adjacent areas in a projected (Continued on page 22)

The Geneva Intermittent Movement: Its Construction and Action

The third in a series of articles which detail the what, the why and the how of the "heart" of the motion picture projector.

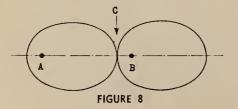
THE star and cam design gives a 3-to-1 movement. The cam is driven by a pair of *elliptical* gears having a 1-to-1 ratio. The shaft is located at one of the foci of the driving gear, making the gear appear to wobble as it revolves.

In Fig. 8, A is the shaft center of the driving gear, and B is the shaft center of the driven gear, to which the cam is fastened. Shaft A has a comparatively heavy flywheel, to maintain a constant angular velocity of the driving gear. The driven gear varies greatly in its angular velocity, and the cam is so arranged that it moves the star when the velocity of the driven gear is greatest.

The angular velocity ratio of the two gears varies according to the respective radii of the gears at the point of contact. (The gear teeth are not shown; the gears are shown as two blanks, or friction gears, that would roll on each other as do the toothed gears.) The radius of the driving gear at this instant is the distance A to C, and BC is the radius of the driven gear.

This ratio is about 5-to-1. In other words, B is turning about five times as fast as A, and consequently the cam is also turning at this speed. At this instant the star and cam are in the position shown in Fig. 2, last month: the star has turned through a 45-degree angle and is turning at its greatest speed, and simultaneously the cam also is turning at its greatest speed, thus producing an extremely fast movement.

The angular velocity ratio of the two gears is constantly changing: for each fraction of a degree that gear A turns, gear B turns a different amount, except at two positions of A where both gears have the same angular velocity. This holds true, however, for only an instant. The speed of B has been increasing up to the moment shown in Fig. 8. From here on B slows down and continues to do so until both gears have turned one-half revolution. Then B accelerates again, until the position of Fig. 8 is reached once more.

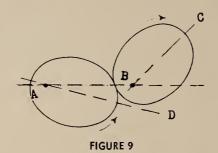


By A. C. SCHROEDER

Member, IA Local Union 150

In Fig. 10 both gears have turned onehalf revolution from the position of Fig. 8. B now turns about 1/5th as fast as Athus allowing a long time before the cam pin enters the star again.

Figure 9 shows the gears at the instant the cam pin enters the star, which is 45 degrees before the position shown



in Fig. 8. The line BC is drawn through the foci of the driven gear, being 45 degrees from the horizontal line. Line AD is drawn through the foci of the driving gear, being approximately 12 degrees from the horizontal line. In Fig. 8 the foci of both gears coincide with the horizontal line, therefore A

turns 12 degrees from the position in Fig. 9 to reach the position in Fig. 8; while B turns 45 degrees.

After the gears pass the position of Fig. 8 the action is similar, but in reverse order. Consequently, B turns 45 degrees past the position of Fig. 8, while A turns 12 degrees beyond this

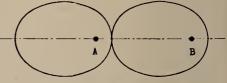


FIGURE 10

position, and the cam pin is now leaving the star. The total movement of B was 90 degrees, while A turned only 24 degrees, during which time the film was pulled down.

The shutter turns at the same speed as gear A, and for each revolution of A one frame of film is pulled down. A acts just as the flywheel and the camshaft in our conventional machine, so we must calculate the speed of the movement from A. Since the film is moving only while the flywheel turns 24 degrees, it remains stationary for 336 degrees of flywheel travel. 336 being 14 times 24, we have a 14-to-1 movement, which is some speed and requires a shutter with about a 24-degree blade. Our regular shutter blade is about 90°.

Obviously, a 14-to-1 movement is hardly practical, and in an actual movement the gears would be more nearly circular. The angular velocity of *B* would not vary so much, and we would produce a movement with a speed around 5- or 6-to-1.



LETTERS TO THE EDITOR

To the Editor of IP:

I am having trouble with one of our arclamps. We are using Recto-O-Lite mercury-vapor rectifiers with Brenkert lamps pulling 41-43 amps and using a 6-7 mm trim. One of the lamps works fine; but the other has a tendency to drive the carbons too closely together, causing distortion at the time of the changeover, and sometimes goes out completely.

ISMAEL DIAZ-COLON

Wallkill, New York

NOTE: This is a tough one to figure out from afar. It would seem that one of the mercury-vapor rectifiers is not operating properly. The defect may be a loose connection in the transformer or its switch, a partially short-circuited reactance coil, or, more likely, a failing rectifier bulb.

The tendency of the carbons to approach each other too closely clearly indicates a drop in current (amps), causing the feed motor to speed up. A large drop in the current will, of course, extinguish the arc.

If it is known definitely that all electrical connections in the lamphouse are OK, the carbon holders clean and gripping the carbons tightly, then the trouble is definitely with the rectifier—bulb, transformer, or reactance choke. All connections and switches should be checked as an added precaution.



Here's a new 16mm Eastman original camera color film that's sure to make a hit with producers of industrial and professional films everywhere.

Ektachrome Commercial Film, Type 7255 is 2 to 2½ times faster, with better definition than you've ever seen before. What's more, it does not render existing color stock-shot files obsolete (new film may be inter-cut with older types). And we can provide dependable service or, if you

wish, advise you on doing your own processing.

All of which adds up to better pictures, many of them taken under circumstances impossible formerly; cooler, more comfortable shooting; faster deliveries. In fact, better satisfaction all around! For technical details, inquire...

Motion Picture Film Department

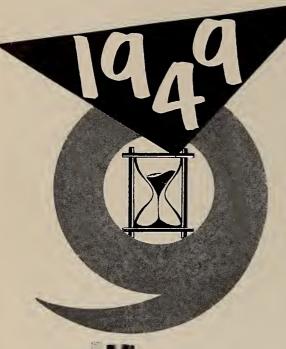
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"MIGHTY 90" INTRODUCED IN 1949



"SUPER 135" INTRODUCED IN 1953



"U-H-I" INTRODUCED IN 1957



"JETARC" INTRODUCED IN 1958

years ago

Strong Electric Corporation made news by putting into production an automatic carbon arc crater positioning device. This control today continues to be the best means of completely eliminating erratic performance of the light source.

Maintenance of constant light level, unchanging color, and distribution of light over the screen surface were afforded by this Lightronic control which was built right into Strong projection arc lamps, first in the Mighty "90", then the Super "135", and subsequently in the "U-H-I" and "Jetarc".

Precision maintenance of the carbon crater at the correct position in relation to the reflector was attained through the use of not one, but two motors, one to automatically control the feeding of each carbon, but with both feeds adjusted through the use of a single common control.

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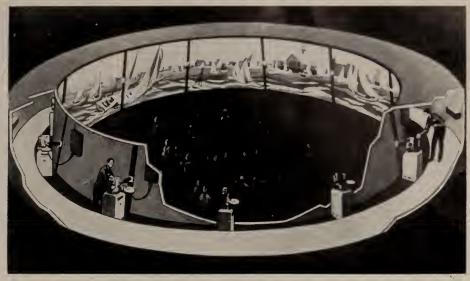
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MOVIES OF THE FUTURE?



Artist's rendering of the Circarama Theatre in the American Pavilion. Audience, surrounded by segmented circular screen views scenes projected by 11 projectors in sync., each of which projects on the screen segment directly opposite.

Projection at the Brussels World's Fair

BESIDES SPUTNIKS, souvenirs and prize cows, the latest methods for exhibiting motion pictures were unveiled by the nations of the world at the 1958 Brussels Exposition. Nearly every pavilion at the fair has a movie theatre for the exhibition of documentary "travelogues" relating to the beauties and accomplishments of its country.

These theatres are fascinating to movie fans because of the unusual projection techniques—you can see movies on the floor, on the ceiling and even all around you.

Czechoslovakia's two unique movie systems are among the big hits. The Czechs, in fact, display what could be a major, exciting change in show By ALINE MOSBY

The appended article should prove of fascinating interest to all who are interested in either the artistic or technological aspects, or both, of motion pictures. It was written expressly for and published by American Cinematrographer, by special arrangement with which it appears herein.

business—live action combined with motion pictures! And in the Czech pavilion tourists also can view a film projected on eight separate screens—a fascinating, artistic system called Polyecran.

The Italians present Aviorama on three big screens—one at the feet of the audience, one on the ceiling, one at eye level. The Americans did that one better with Circarama, a screen in a complete circle around the spectator.

The Russians reveal their widescreen system, Panorama, for the first time outside Russia. The American Cinerama also is on display at the fair. The Belgian Congo movie is shown in a complicated medium called Congorama. Many of these systems, U.S. tourists agree, would be lively additions to the entertainment world if used in special productions in other large cities.

Here is a more detailed description of these unique systems:

Czech's Stunning Shows

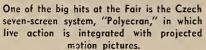
CZECHOSLOVAKIA: This 24-act, two-hour show is called "The Magic Lantern." Most of these scenes are in a motion picture shown on a Cinema-Scope screen, but now and then the film is linked with live actors who perform on a stage in front of the screen.

Narrating the show is a pretty Czech



In a 24-act, twohour show, the life and works of the Czech people are shown in motion pictures supplemented by live dancers performing simultaneously on the stage. The Czechs insist that this technique is no mere novelty but has definite commercial presentation application.





actress, Sylvia Danickova. The Czechs ingeniously solved the language problem. Belgium has two national languages, French and Flemish. The Czechs also are conscious of the American tourists. So Miss Danickova became triplets. She appears at the same time, via film, on two long narrow screens that flank the CinemaScope screen. In one she speaks French, in the other Flemish. Then the reallife Miss Danickova steps out on the stage in person to speak English and chat with her two filmed selves.

As the film unfolds on the screen, a pianist suddenly appears on the stage via an ascending platform to augment the screen presentation with his keyboard artistry. Later, when an orchestra is shown on the screen and the pianist accompanies it, we see that the orchestra is composed of multiples of the same man—the versatile pianist on stage—who is shown, through trick photography and optical printing tricks, playing every one of the instruments. Live dancers also perform on the stage in conjunction with the film.

Live Dancer 'Catches' Film Image

But the most applauded scene is the unusual dance of a man on the stage while behind him on the screen you see the filmed mountains of Czechoslovakia. Then superimposed over the mountains, via a second film projector, is a tiny figure of a dancing ballerina. Suddenly the live dancer picks up a large white disc and "catches" the projection of the ballerina on it.



A live dancer performs on stage in front of a CinemaScope screen in the "Magic Lantern" revue in the Czech Pavilion. Image of tiny ballerina at left is projected on the screened scene by a second projector.

As he moves about the stage, the image of the ballerina moves on the disc with him!

The male and female dancers rehearsed their dances separately, but using the same general choreography, while the cameraman plotted their every move. Then he filmed the ballerina, a mask on the camera blotting out the background so that only her figure showed. While she danced, the camera moved on a dolly, repeating the same movements that the male dancer would later make on the stage in the theatre.

The effect is startling and never fails to bring wild applause. Alfred Radok, "Lantern" creator, thinks the live-film idea could be used to combine dances, songs and stories for special theatrical performances.

The film section of "Lanterns" has many effective shots. For one, the bottom two-thirds of the screen is blacked out. In the top third only the feet of some folk dancers are visible. In another scene, shots of famous Czech glassware are projected first on a gauze curtain (scrim) on the front of the stage and, through that, to the CinemaScope screen behind, giving an interesting double-image effect.

Multiple Inter-Screen Movement

The other fascinating Czech film projection "invention" is "Polyecran," a 16-mm documentary. For this show, eight screens of slightly different shapes are placed in a small recessed stage lined with black. Two of the screens hang virtually from the ceiling, but tilted for good viewing; two are tilted upward from the floor,

and the other four are scattered at eye level. The audience sits on low stools to watch the 10-minute performance.

Instead of editing one roll of film to bring movement, the "cutting" is done virtually by having the action spring from one screen to the next.

In a ballet scene, for example, you see an orchestra on one screen; on another, a ballerina on stage. Inspiring scenes of flowers fill another screen while, for effect, the other remaining screens are black for the time being. Suddenly the dancer leaps from one screen to the next, and finally is "frozen" in the middle of a leap into a still photograph. At times the feet of other dancers flash on the other screens.

Novel Production Method

The film for this presentation was made as follows: various cultural events of Prague were first documented by a cinematographer. The resulting footage was then assembled into eight reels and carefully edited so that the action moves smoothly from one reel to the next. Some of the scenes are in black-and-white, some in color.

To screen this film, eight projectors were set up above, below and to the sides of the little stage. Augmenting these are three slide projectors which are used to flash still photographs on and off some of the screens in conjunction with the carefully planned presentation. All projectors work automatically—the entire ingenious performance being controlled by electronic

(Continued on page 20)

WHAT CLICKS AT THE BOX OFFICE?



A scene from Jerry Wald's IN LOVE AND WAR for 20th Century Fox.



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"NATIONAL" CARBON ARC brightest man-made light!

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UNION CARBIDE

In the SPOTLIGHT

"Right to Work" Law is Denounced

BECAUSE the so-called "right to work" law will be on the ballot in not a few localities in the upcoming November elections, the Political Action Committee of the AFL-CIO is sparing no effort to insure, first, the registration of all Union members and their families, and. second, the widest possible dissemination of its views regarding this type of legislation.

Officers of Unions have of course long been briefed in detail as to their work in opposition to such legislation, but there is some concern being expressed that the "message" will not filter down to and through the rank-and-file.

IP and all other craft journals have been urgently requested by the PAC to publicize in their issues immediately prior to the election the bitter opposition of the AFL-CIO to any such law, however tagged. Some of Labor's biggest guns have been employed in the campaign, with President George Meany being particularly active in bestirring Union voters.

Appended is an excerpt from a recent declaration by Meany on this topic:

President Meany's Declaration

"Without such a law he (the employe) has the right to work if the employer has a job and wants to hire him, if he punch-



Edward Dougherty, IA Local 384, Hudson County, N. J., and prexy of 25-30 Club, presenting Eddie Lachman with gold honorary membership card. Center: Harry Mackler; right, John Krulish.

es the clock on time and observes all the . . . rules, if he is qualified, if the employer does not discriminate against him because of age, physical condition or color, and any number of other conditions that may be applied.

"With such a law he still has the right to work if—he is not protected by a union shop agreement. . . . In return



Morris J. Rotker (right) receiving engraved desk set from Judge Nathaniel Doragoff at 25-30 Club party.

for an unwanted goldbrick called the 'right not to join a union,' which has all the charm . . . of 'the right not to eat,' he is compelled to surrender a positive right. . . .

"The concern of those organizations favoring right to work laws is the concern of the wolf for the lamb or the shark for the trout."

• Two tireless workers in the projection vineyard were honored at the annual Fall gala of the 25-30 Club of New York: Eddie Lachman, president of Lorraine Carbons, Inc., and Morris Rotker, past-president of the Club. To Eddie went a gold honorary membership card; while Morris was given a stunning pen-and-pencil desk set bearing an engraved plate.

These presentations were well-deserved tributes by an organization which includes among its membership standout practitioners of the projection process throughout the United States and Canada.

Space limitations do not permit the inclusion herein of all those who turned out to pay tribute to these two men not only as co-workers but as friends, thus they will have to be joined in a statement identifying them as prominent manufacturers, directors of projection in a score of standout exhibition spots, servicing personnel from the electronics companies, theatre executives, and fellows who daily put on the shows which translate an inert medium into vibrant images on the screens of many theatres.

Although there were a few "rough and unsparing" spots in the Lachman presentation, Eddie took it with all that innate good grace and spirit of helpfulness which has long characterized his activities in the projection field. And as for Morris, candor compels the observation that he took his award as though he were entitled to it—which he most assuredly is for his years of unremitting service to the craft.

• One of our boys. Nat Golden (IA Local 160, Cleveland) has for the third straight time been a guest at "Photokina," the international photographic and motion picture exhibition at Cologne, Germany, whereat on two previous occasions he has been a guest speaker.

Nat's imposing title is Director of the Scientific, Motion Picture and Photographic Products Division, U. S. Chamber of Commerce.

OBITUARIES

Boscarelli, Anthony, member of Local 384, Hudson County, N. J., died September 28 last of a heart attack. A projectionist for 42 years, Boscarelli held office in the Local as President and as business representative. He was a past president of the 25-30 Club of Greater New York, and was also a life member and president of the Central Labor Union of Hudson County. He is survived by his wife, a daughter, and two sons.

SEADEF'K, JESSE J., 72, charter member of Local 253, Rochester, N. Y. died last month. Illness forced his retirement as projectionist at the RKO Palace Theatre in Rochester, where he had worked since the theatre opened in December, 1928. Seadeek was one of a group of projectionists who traveled extensively through Russia and Siberia shortly after World War I showing movies to American troops stationed there.

Barron, Jasper, 57, member of Local 249. Dallas, Texas, died recently after a lingering illness. He was associated with the Rowley United Theatres for more than 25 years, having been one of the first projectionists employed at the circuit's Texas Theatre in Dallas when it opened back in 1932. Survivors are his mother, wife, and a son.



AUDIO - VISUAL

EDUCATIONAL · INDUSTRIAL · COMMERCIAL

Notes on Filmstrip Technique

By JOSEPH HOLT

A-V Equipment Consultant

THE 35-mm filmstrip is one of the most useful tools in the audio-visual field, having gained widespread popularity because of its simplicity, effectiveness, and economy. At the same time, directors of audio-visual services experience considerable difficulty in keeping the library of filmstrips in the best possible condition. Fortunately, certain steps can be taken to surmount this difficulty.

Some manufacturers offer free replacement of strips which may be damaged in use, but this does not answer all the needs of conserving the supply so that it may be used at will.

The Most Common Trouble

The most common trouble is with that portion of the strip used for threading the feed sprocket of the projector. Any user of strip projectors may damage film irreparably by a few seconds of carelessness, regardless of his degree of training or of the amount of caution enjoined upon him.

One way to obviate this type of damage is to add about one foot of blank leader to that provided by the supplier. In this way, damage likely will be principally in that portion of the film which has been added. As soon as the first sprocket holes are torn, the additional footage may be replaced, and, taking this precaution, the strip may be preserved intact for its normal life expectancy.

Picture Area Tearing

Another common damage is one which has no ready explanation—the tearing of sprocket holes within the picture area. Anybody with any significant experience in the A-V field knows that such mutilation occurs while the strip is in normal transport. Heretofore, once the damage was done the only recourse was to delete the torn portion and edit the script in order to cover the omission. Modern technique makes it possible to repair virtually all such torn spots without the loss of a single frame! Without the

"sprocketed Mylar" tape, the task would be much more difficult.

Here is the best way to effect repairs of torn sprocket holes without the loss of picture content:

Repairing Sprocket Holes

Examine the perforation edges. If they are roughened and abraded, trim the edges of the sprocket holes until they are smooth and offer no possibility of jamming the projector

HOMOGENEITY: All those active in the non-professional A-V field will profit by reading the article "Image Contrast and Picture Quality," written by a professional for professionals. Proving once again that in the visual field there is no sharp line of demarcation.

mechanism. Once the edges have been smoothed, it is necessary only to apply the sprocketed Mylar tape carefully *in perfect register* with undamaged holes on each side of the torn area.

Tape is required on only *one* side of the film, but no harm will ensue if the tape be applied on *both* sides. The widely prevalent notion that tape distorts color values and causes a shift in focus position is nonsense,

considering the brief period during which the image is viewed.

Should those using the filmstrip be unable to avoid repeated damage to the picture area, the writer recommends cutting the strip into single-frame size and mounting each frame between suitable glass slide binders. Most strip manufacturers place a reference number on each frame which is visible during projection, thus permitting easy sequential arrangement of the slides.

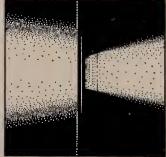
Little damage can occur to the film once it is mounted properly between glass. Dust and oil may be wiped off without fear of injury to the film, but this procedure offers another advantage: once the film has been mounted in glass, the slides may be placed in numerical order in trays and used in the new automatic projectors.

CAUTION: for those who avail themselves of this advantage it is necessary to use a tray which has been properly dimensioned in order to accept the glass binder. One manufacturer refers to his trays as the Microfit, which will handle glass or metal binders without trouble.

Automatic-Type Projector

A further advantage may be realized with the automatic-type projector, enabling the user to set a prescribed time interval for each slide to be projected and then the

"Diffuse" and "Specular" Illumination for Projection





Motion-picture projectors employ "specular" illumination of the film aperture for the highest luminous efficiency. The light rays diverge only slightly after passing through the aperture hence all of them

may be collected by a projection lens of adequate diameter to form a bright picture on the screen.

"Diffuse" illumination prevails in "opaque" projectors and in conventional TV projection systems. The rays spread out from the illuminated picture in all directions, making it impossible for even the largest lens to intercept all of them. Most of the light is wasted, and the projected picture is dim.

next slide to be shown without attention by the operator.

By the use of a remote cord, the user may bring each slide up for viewing at *irregular* time intervals by using the button provided.* This arrangement complements the use of a pointer on the screen, and permits the person showing the slides to remain near the picture. Such positioning allows the explanatory comments to issue from the vicinity of the picture, and almost everyone is *conditioned* to such an arrangement due to the placement of the sound reproducing units.

The advantages of the automatic tray-loaded slide projector justify its additional expense. By removing the principal causes of the film damage, we render a real service to the A-V field. We who are active in this area simply cannot tolerate streaks, scratches, finger-marks, or dirt on the film.

By resorting to the tray-type projector, we may eliminate the handling of individual slides. This means that pictures are available properly oriented and in correct sequence, which is the prime advantage of the filmstrip. The use of the automatic tray-loaded projector is a

*See announcement re: Kodak Cavalcade projector extension cord elsewhere herein.

great A-V aid. Use It!

New Sylvania Tru-Flector 8-mm Projection Lamp

IN STANDARD projection systems (Fig. 1) a reflector behind the lamp and a condenser in front of the lamp are used to collect a small portion of light to direct it onto the film. The light that passes through the film is then collected by the objective lens and directed onto a viewing screen.

The efficiency of such a system is usually determined by the amount of light (or solid angle of light) collected by the condensers providing they match the rest of the optical system. Unfortunately, mechanical limitations and high costs

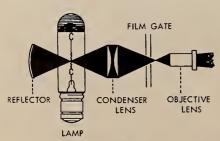


FIG. 1. Conventional projection optical system.

IP Service Bureau Film Cleaning Methods

A recent survey by IP disclosed that much valuable film is being damaged, sometimes irretrievably, by the use of improper cleaning fluids. Once damaged, a given film subject is removed from circulation for an indeterminate period of time, thus frustrating the aims of the sponsor and the teacher.

IP is now prepared to give authoritative data as to the best method for cleaning any film base, irrespective of character. These data are based upon an exhaustive survey conducted (cost-efficiency basis) by one of America's foremost research laboratories.

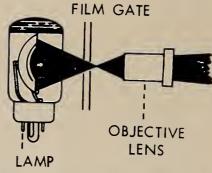


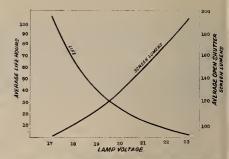
FIG. 2. Sylvania Tru-Flector Optical system.

prohibit the design of highly efficient systems.

The specially designed Sylvania Tru-Flector lamp eliminates the need for external reflector and condensing lenses formerly used in projection equipment. This new concept enables a 150-watt lamp to perform equally as well as former 500-watt lamps—effectively increasing lamp efficiency over 300%.

The Tru-Flector lamp (Fig. 2) not only simplifies the optical system of a projector but greatly increases its efficiency. The special silvered reflector acting as a condenser collects almost a full hemisphere of light emitted by the special coiled coil-filament and directs it onto the film. At a rating of 150 watts this lamp will perform equally as well in 8-mm projectors as one three times its power with conventional objective optics. Its short focal length and special reflector make it ideally suited for use with a 22-mm, f:1.5 objective lens.

Use of an auxiliary transformer with this lamp enables the manufacturer of 8-mm projectors to ex-



Comparative characteristics of the 8-mm Tru-Flector projection lamp.

ert greater control than ever before over the lighting characteristics of his equipment. He may select whatever combination of lamp brightness, life, and operating voltage he desires, and order transformer settings to conform.

For example, the transformer could convert standard household voltage of 120 to a 21-volt lamp operating voltage. With a 1-inch f:1.6 objective lens, this would produce projector light output of 150 openshutter screen with an average rated life of 15 hours.

Graflex 35-mm Slide Unit

A NEW remote-controlled 35-mm slide projector, utilizing a unique slide pre-conditioner which prevents slide popping, has been announced by Graflex, Inc., of Rochester.

It will be known as the Constellation Mark II. The Mark II has a specially designed, highly efficient lamp, optical system and cooling system. It has a smaller, excellently cooled new Tru-Focus lamp which is pressurized for longer life and increased brilliance. A 4-element optical system makes maximum use of the lamp's brilliance through the transparency and onto the screen.

Slides pop out of focus as a result of the very rapid temperature change that takes place when a cold slide is exposed to sudden heat from the projector lamp. By providing warm air, carefully tem-



Graflex 35-mm slide projector

perature-controlled and evenly distributed over the slides in the magazine, the Mark II overcomes this problem. A bulb-saving, three-position switch allows lamp to be turned off and fan left running for rapid cooling of lamp and projec-

tor housing.

The Mark II uses an Airequipt slide changer, can be operated by means of a 15-foot remote control cord. The Airequipt changer eliminates slide handling and provides a safe storage place. A Graflex slide timer can be used for fully automatic operation at selected intervals of 5, 8, 12, 15 or 20 seconds. Slides may also be changed by a push-button on the projector or by manual movement of the slide lever. The Mark II, which also has a single frame stereo slot, retails for \$99.50.

25-Watt Kodak Pageant

Now AVAILABLE is the latest model Kodak 16-mm sound projector, the Pageant AV-255-S, offering the following advantages: 1. A powerful 25-watt amplifier with printed circuits for maximum ruggedness and reliability. 2. A new, heavy-duty, 11-by-6-inch oval speaker. It has a 1½-inch voice coil, usually found only on speakers 12 inches or larger. The baffled speaker has a 5.2ounce Alnico magnet of improved sensitivity and efficiency. 3. One master control panel contains tone, volume and microphone input volume controls. 4. Soon to be available is an optional accessory head for playing magnetic sound tracks as well as optical ones.

Other Proven Features

5. Other proven features are incorporated in the AV-255-S, including permanent lubrication, Kodak Super-40 shutter for extra screen brilliance, single switch for forward and reverse, carbide pulldown claw, folding reel arms, fidelity control, a three-wire cord, singlecase design and optional 1200-watt lamp that provides plenty of light for long distance projection. List price: \$535.

Kodak Universal Changer

A NEW slide changer that provides increased versatility and handling ease with three popular Kodak slide projectors has been introduced by Eastman. The Universal Changer permits all three types of slide mounts-cardboard, glass or metal—to be shown by the Kodak



Your SIMPLEX Projector Mechanism represents a priceless investment. You bought it after long, careful study because you recognized it as the finest projector on the market.

Don't take chances with such an investment the very success of your theatre depends upon its performance! When spare parts are necessary, insist on the best insist on SIMPLEX parts!

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NATIONAL THEATRE SUPPLY COMPANY · BRANCHES COAST TO COAST



Kodak Universal slide changer

300 and 500 projectors. With a simple adapter the changer may be used with the Kodaslide Signet projector, Model 2.

Built into the changer is a newly designed shutter which darkens the screen between slides: the slide doesn't "move" across the screen. The new molded trays used with the changer hold 36 slides in any combination of the three types of mount.

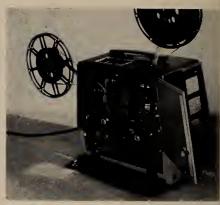
The Universal Changer plus one tray may be obtained as standard equipment with a new Kodak 300

projector at \$69.50 list, and with the Kodak 500 at \$79.50. The changer itself lists at \$11.95 complete with one tray. The adapter for the Signet projector is 50 cents. The molded slide trays list at \$5.50 for a carrying carton of six trays.

Bell & Howell 398A Unit

A NEW, high-quality easy-to-use 16mm sound motion picture projector designed especially for audiovisual instruction is the Bell & Howell 398A Specialist Filmosound, with a custom-made oval speaker built into the projector case and front-positioned so that it is always directed at the audience, and has been simplified for broader use in the classroom.

Features on the new 398A include polished sapphire jeweled inserts on the shuttle, guide rail and slide



B. & H. 398A Filmosound projector

tension clips providing maximum protection of film, the square-pattern shuttle with positive film advance stroke, and all-gear drive for uniform, synchronous operation. Also, a new rotary dial switch that operates both motor and lamp in one twist, a permanently attached line cord for faster setups, and automatic rewind release that prevents film damage.

10-Watt Amplifier's Wide Range

The new 10-watt amplifier in the 398A is designed to operate over a wide range of power conditions, even where line voltage is low. Efficiency is equal to the 8'' speakers in the more expensive 399 Specialist projectors because of improved baffling design. Optional features for the 398A are the Filmovara variable focus lens (134'') to 244''), loop setter and hour meter attachments. List price: \$459.95.

Kodak Remote Extension Cord

A new accessory available from Kodak gives a longer "range" to teachers and lecturers using the Kodak Cavalcade Projector. It's a 25-foot remote extension cord which permits slide changing from distances farther than the 12-foot cord supplied with the projector.

The Cavalcade changes slides either automatically or at the press of a button on the cord. One or more of the Remote Extension Cords may be used with the regular projector cord if it is desired to change slides at longer distances from the projector. List price: \$2.25; available through Kodak dealers.



- BRIGHTER LIGHT
- LONGER BURNING
- SHARPER PICTURE

Free Test Samples



- STEADIER LIGHT
- LESS ATTENTION
- PERFECT COLOR BALANCE

Free Carbon Chart

Westrex Expands Service Under Litton Aegis

Purchase of Westrex Corp. by Litton Industries, Inc., Beverly Hills, Calif., gives the latter a 50-nation distributing network for its products. Westrex was formerly a wholly-owned subsidiary of Western Electric Co.

Operating 19 foreign sales, service and distribution subsidiaries, Westrex employs more than 1200 persons, 1,000 of whom are overseas, and it maintains an assembly plant in England. Gross income for 1957 was \$13 million.

Expanded Westrex Distribution

Westrex foreign offices are now distributing Litton communication equipment, radio antennae, radar landing systems and medical x-ray units. They will continue distributing abroad the products of approximately 25 other manufacturers now being handled by them as well as distribution and servicing of sound recording systems for the motion picture



R. E. Warn will head the expanded Westrex setup as v.p. and gen. mgr.

and record industry. Westrex recently developed stereophonic disc recording and reproducing equipment. Also, it is now the outlet for a line of tropospheric and ionospheric scatter relay equipment for over-the-horizon communication and a new line of communication power wire and cable.

Glen McDaniel, of Litton, becomes president of Westrex, with R. Edward Warn becoming vice-president and general manager. The latter, together with Harry Allinsmith and Roland Colistra, all original Westrex men, are board members.

The theatre and recording fields know Warn well, since he started in 1928 as an engineer with ERPI, former Western Electric subsidiary, and in the interim has served Westers in various executive positions both in America and abroad.

Revised ASA Film Standards

Two revisions of American standards for motion picture films and projector lenses have been approved and published by the American Standards Association. Sponsored by the S.M.P.T.E., they are: PH22.73-1958 — American standard dimensions for 35-mm motion picture film, perforated 32-mm 2R-2994, and

PH22.28-1958—American standard focal lengths and markings of 35-mm motion picture projection lenses.

American Standard PH22.73-1958 specifies the dimensions of 35-mm film having two rows of 16-mm type perforations, one near each edge of the 35-mm film.

The main difference between the 1958 revision and the 1951 version of the standard is in the decrease in the values for the dimensions of perforation intervals.

American Standard PH22.28 specifies the increments in the focal length of lenses up to 7 inches in focal length, the permissive tolerances between actual and designated focal length, and the marking on lenses used in 35-mm motion picture projectors.

Coming Events Cast Shadows

The first permanent TV teaching program in New York State was inaugurated on Sept. 2 at headquarters in Cortland. Premier program was a Spanish lesson shown through 32 receivers with 21-inch screens located in eight schools in three adjacent communities.

In the lessons a two-way audio hookup permits teachers and pupils to ex-



change questions and answers. The program will include lessons in geography. chemistry, art, junior-high English and reading. The seventh and eighth grades will receive all their music instruction by TV. An important consideration was the fact that there is a State teachers college in the immediate area.

The program is designed to supplement classroom teaching. Similar programs will eventually be set up in other numerous school districts of the State.

New Simplified Test Film

A new test film in the offing will be titled "35-mm Theatre Projector Align-

ment Test Film." produced by the Motheatre projection practices.

One Target Replaces Three

The film consists of one target, replacing the old three-target film, being much simpler to use. It will permit the projectionist to determine aperture sizes for normal and wide-screen projection. The target will include a travel-ghost and a jump-weave test.

tion Picture Research Council and sponsored by the Society of Motion Picture & Television Engineers. The "book" for its preparation was written by Council engineers in their nation-wide survey of

cue tape. Definite Commercial Value Seen

MOVIES OF THE FUTURE

AT BRUSSELS FAIR

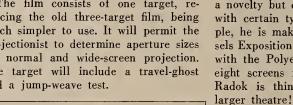
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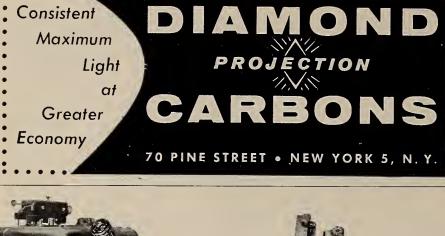
equipment monitored by a magnetic

Radok thinks the system is not just a novelty but can be used commercially with certain types of films. For example, he is making a movie of the Brussels Exposition to be exhibited in Prague with the Polyecran system. And while eight screens may surprise Westerners. Radok is thinking of using 26 for a

ITALY: The Italians' new projection system, Aviorama, goes the wide screens one better by extending the screen in a curve both at the top and bottom. The spectator looks at three normal-sized screens linked together-one at the usual eye level, one tilted up from the floor, the other tilted down from the ceiling. The audience sits around three sides of the "pit" that holds the floor screen.

Projection is simultaneous from three







VATIONAL THEATRE SUPPLY COMPANY . BRANCHES COAST TO COAST

New Standard for Testing

NEW AMERICAN STANDARD (PH1.29-1958) for determining quantitatively the departure from physical flatness of photographic films in sheet, roll, or strip forms prior to exposure and processing. Values obtained may be useful in indicating relative performance of materials in cameras, printers, and other equipment.

The standard assigns numerical values to the curling property for samples of photographic films. In one test method a square sheet of the material is measured; in a second method, covering motion-picture type films, the curl across the width of a length of film is measured; and in a third method a small narrow specimen is measured. These measurements may be considered to be quantitative in nature only to the extent that the numerous variables that may be introduced have been controlled and standardized prior to the test.

Limitation of Standard

The methods may be applied to processed films, and may be useful to indicate their performance during handling and viewing, as well as in projectors, enlargers, and other equipment. Standard is not intended for use in determining the curl characteristics of films during processing stages, including drying.

Copies available at 75 cents each from ASA, 70 E. 45th St., N. Y. City



Congorama Theatre, part of the
Belgian Congo exhibit at Brussels,
is decorated with
illuminated models of native gem
stones. Illuminated map at rear
slides back to
reveal projection
screen on which
movies, integrated
with the program,
are projected ot
intervals.

projectors, as in Cinerama—one being placed on the ceiling, one in the pit and the other in the back of the theatre. The effect gives you a feeling of "you are there"—you see the sky, the horizon and the ground in front of you. Three cameras were mounted together on an airplane for the aerial views of Italy.

U.S.A. Circarama Show

UNITED STATES: The U.S. Pavilion has a gimmick that takes the wide-screen craze to its ultimate end—a 360-degree screen that keeps going all the way around the room. This is Hollywood's Circarama system, which is not "new," having been developed by technicians at Walt Disney studio and first shown at Disneyland the amusement park near Los Angeles three years ago. [International Projectionist for Sept., 1955, p. 10.]

The Ford Motor Co. Fund paid half of the \$400,000 cost to produce the new 18-minute, 16-mm film on the American scene for the Circarama theatre. To achieve the circular effect, 11 cameras were mounted in a circle and placed either atop a car or on the underside of an airplane.

In the theatre, 11 screens, each nine feet high and eight feet above the floor, are arranged in a circle 142 feet in circumference. Eleven projectors then are stationed behind the screens, each projector throwing its image literally through a slit in one of the screens to the screen on the opposite wall.

Russians Ape Cinerama

Russia: The Russian system, Panorama, was shown for the first time in the West here since its debut in Moscow in 1956. It was adapted from ideas advanced by the French in 1926 (also said to be the basis for Cinerama), and is virtually identical with Cinerama. The Russian system employs three projectors and three joined screens, totaling approximately 81 by 29 feet, with a curvature of 145 degrees.

As in Cinerama, three cameras were

linked together to shoot a 1½-hour travelogue on Russia for the Panorama exhibit,

In the Panorama theatre the projectors are installed in rooms concealed at the back of the theatre. Actually, six projectors are used, the extra three operating for the last half of the show so that no intermission is necessary for a changeover of reels.

Nine sound tracks are used to feed stereophonic sound to nine loudspeakers. Five are placed behind the screen, three around the theatre, and one in the ceiling. An engineer sits at a control board in the center of the theatre. He starts the projectors, controls the focus and the loudspeakers, and operates the electric motors controlling the curtains and lights.

The Panorama screen is solid in the middle, the sides consisting of thin white plastic strips. The screen can be parted in the middle and moved off the stage to make way for live performers or a regular size screen.

Panorama officials say they already

are at work on a second feature for which they have already filmed scenes of the University of California's marching band that is part of the U.S. exhibition.

Belgian Congo's Versatility

Belgian Congo: To show a travelogue of its country, the Belgian Congo Pavilion uses everything in the book. First you see a huge map of the Congo that lights up to point out different parts of the country, as the recorded narrator speaks. Now and then it slides back to reveal a movie screen, on which is projected one of the many films integrated into the program. Flanking this screen are two small screens for showing other films.

On the ceiling and walls lighted pieces of rock are mounted to illustrate the minerals, etc., of the country. Even the walls of the theatre get in the act. These are also maps that light up and they, too, slide back to reveal illuminated stage settings of typical Congo life. To effect the animated lighting effects on the big wall maps requires 5500 tiny light bulbs plus a vast network of electric wiring.

The entire business—lights, film projectors, sound effects, music, narration, maps and sliding walls—is controlled and operated by an electronic "brain".

Surveying all these innovations in Brussels, one arrives at this conclusion: in most of the European countries. electronics, mechanics and super-showmanship are being integrated with motion pictures and live action on stage to produce a new type of theatrical entertainment. In all the displays or systems, the motion picture is the backbone and the foundation.



IMAGE CONTRAST AND PICTURE QUALITY

(Continued from page 7) picture have brightnesses of 4 and 8 ft-L's a contrast factor (not gamma!) of 1 exists between them:

Contrast factor
$$=$$
 $\frac{B_2}{B_1} - 1$ $\frac{8}{4} - 1 = 1$

Now assume that 3 ft-L's of spilllight come to the screen from lamps in the auditorium. The resulting brightnesses of the two areas are 4 + 3 = 7and 8 + 3 = 11 ft-L's. The contrast factor is then reduced to 0.57, an

ULTRA-COLD MATTER will be researched with world's most powerful, continuously operating electromagnet, just installed at University of California. Chemists will be able to study matter in its degenerate state at temperatures approaching absolute zero (-459.6°F). Finding should aid in work with radar, missile guidance systems, computers; also give exact information on non-available energy contained by various materials.

appreciable loss, by any standard.

The loss of contrast becomes even greater in the darker areas of the projected images. If two areas have brightnesses of only \(\frac{1}{4}\) and \(\frac{1}{2}\) ft-L (a contrast factor of 1), 3 ft-L's from spill-light sources reduce the contrast to a value of 0.077. At this low contrast factor, the pictorial detail is virtually fogged out.

It may seem that the effects of low levels of spill-light from wall fixtures, etc., can be overcome by increasing the intensity of the projector arclamps. This is true only in a certain sense, for while brighter projection illumination largely restores the contrast values of highlight areas in the projected pictures, an overall loss of contrast prevails even though the visibility of shadow detail is restored. The result is a "thin" picture analogous to the type of image obtained with too low a photographic gamma.

To prove this point, consider a picture projected in a nearly dark room. Assume that the deepest blacks in the picture have a brightness of 0.1 ft-L, and that a selected highlight area-a

certain tone of gray—has a brightness of 6 ft-L's. This represents a black-tohighlight contrast factor of 59. Now assume 1 ft-L of spill-light and a fourfold increase in projection light. The contrast factor of the two areas under consideration is reduced to a value of 17:

$$\frac{1+24}{1+0.4} - 1 = 17$$

This is a significant contrast loss. And even with a tenfold increase in projection light (unthinkable!) the contrast factor of the two areas assumes a value of only 29.5.

It is of interest to realize that the deepest blacks encountered in both B & W and color release prints have a photographic density of about 2, representing a light transmission of 1%.* At 9 ft-L's of clear-film screen brightness, therefore, the deepest blacks in the pictures are not really black at all but dark grays having a brightness of 0.09 ft-L in the absence of spill-light. Low as this brightness is, it is nevertheless visible as light, and a piece of dirt caught in the projector aperture and held over such a "black" area can be easily seen.

Since deep-shadow detail may lie in the neighborhood of 0.1 to 1 ft-L when projection light is normal, even a very low level of stray light on the screen must be considered detrimental to pictorial naturalness. Without any contrast at all, we have no picture, and without adequate contrast, the pictorial quality is poor. Projectionists can preserve the contrast range of the release prints by intelligently directed efforts.

* The density of a film is the common logarithm of its opacity; and the opacity is the reciprocal of its transmission, thus: Opacity = 1/Transmission. Hence: Density = log 1/Transmission, or, conversely, Transmission = 1/log-1 Density. Accordingly, a film transmitting 100% of the light has a density of 0; transmitting 90% (average clear film), a density of 0.045; transmitting 10%, a density of 1; transmitting 1%, a density of 2. The density of overexposed completely developed black film is about 3 (transmission 0.1%).

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MANUAL OF PRACTICAL PROJECTION

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Monthly Chat

Projection Distortion Re-Discovered

Confession is good for the soul, they say, but the compulsive urge for expiation should not be regarded as a warrant for repeated transgressions—that is, in every quarter except that occupied by so-called technologists in the motion picture industry. These treks to Canossa by the "leaders" in the film world are an annual affair.

Chronologically, the original sin referred to herein was committed five years ago when CinemaScope was introduced along with a mandatory curved screen. This type screen was and is wholly unnecessary, being merely a "gimmick" to delude the hapless and wholly unknowing exhibitor. Of course the process was demonstrated by having the potential customer view the screen from dead center of the orchestra floor. Nothing was said or published about the sight linesfrom either the sides of the orchestra or from the balcony. "Distortion" due to projection angle was a nasty, near-treasonable word.

To get off the ground with CinemaScope its sponsors enlisted a manufacturer into accomplishing an almost impossible task—the design and manufacturer of an anamorphic lens which would not make too obvious the basic deficiencies of such a unit during the projection process.

Now, five years later, there suddenly bursts upon the exhibition field a rash of publicity acknowledging the existence of (one would think it had just been "discovered" instead of having been with us for five years) a "horizontal sag" inherent in the process when a curved screen is used. The sponsors of CinemaScope again turned to the lens manufacturer to overcome what is nothing more or less than projection distortion by making available an "integrated horizontal sag compensator" unit—"integrated" because a simple attachment just won't do the trick.

Although this unit is in the experimental stage, there exists a strong suspicion that basically it will utilize some prism arrangement—this, to compensate for the use of a prism arrangement in the original anamorphic and to overcome the deficiency of curved-screen projection. In short, the hope is to utilize a distortion to control a distortion.

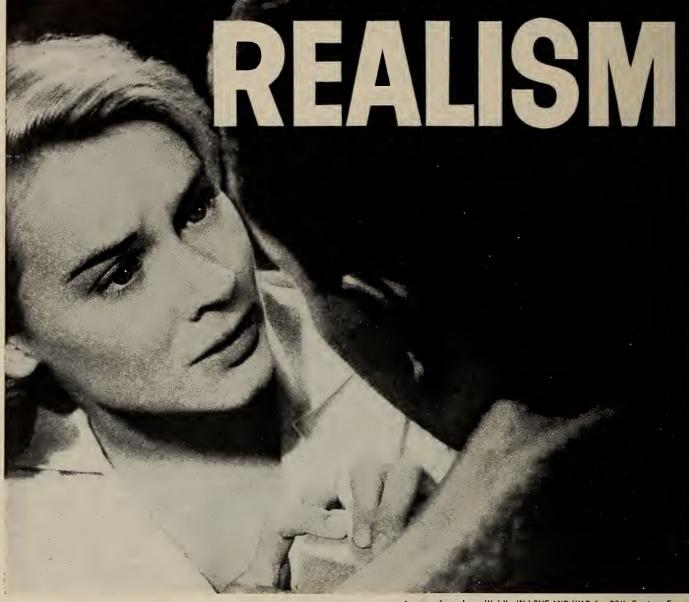
Problems of Chromatic Aberration and Magnification

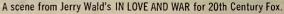
Such a unit presents at least two tough nuts to crack: (1) chromatic aberration in the lens, and (2) horizontal magnification of the screen image in which the aspect ratio might change as much as from 2/1 to $2\frac{1}{2}/1$.

No little of our projection troubles stem from the fact, believe it or not, that 60% of the theatres actually don't know the exact distance of throw from the projection room, rather than from somewhere in the orchestra. Be this as it may, if the writer set out to correct this suddenly-discovered horizontal sag he would use a flat screen and a variable anamorphic which is adjustable for width and for distance—this because the proponents of the "integrated" lens admit that the unit will have to be tailor-made for each theatre! Such a variable anamorphic is obtainable.

Ever since the bright studio boys some 25 years ago dreamed up a new aperture area to "expand dramatic content" and it flopped resoundingly because they forgot or just didn't know about projection angle, this industry has made a series of technological blunders unworthy of an 11-year old school-boy and which have saddled the exhibition field with millions of dollars worth of unnecessary expense and undue tribulation. The overall plan seems to be: compound an error to correct one.—James J. Finn.

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INTERNATIONAL PROJECTIONIST

Volume 33 NOVEMBER 1958 Number 11

Are Lenticulated Screens Practical?

By ROBERT A. MITCHELL

Posing a question relating to an item of projection equipment which has recently been the topic of some eyebrow-raising claims in the trade press. The answer to the question includes a wealth of data anent all types of screens.

THE MANUFACTURE of theatre screens was revolutionized in the middle 1940's when pigmented plastic screens became available. Unlike the old-style painted canvas screens, which required frequent renewal of the reflecting surface for consistently bright pictures, the modern screen with its permanently bright embedded pigments is as good as new after routine cleaning of its plastic surface. It is necessary only to guard against denting plastic screens, for they are rather soft even though backed by a tough fabric.

The tremendous improvement in motion-picture screens is due, of course, to the efforts of conscientious screen manufacturers who have successfully translated the results of scientific research into eminently satisfactory products which have contributed much to the naturalness of theatre movies and to the viewing comfort of moviegoers.

The story of screens is nevertheless punctuated by unsuccessful encounters with technological innovations in the projection art. Technical changes of far-reaching proportions have twice created a state of emergency screenwise and left the door wide open for technologically naive opportunists to undo the more considered efforts of reputable screen manufacturers.

The first "screen crisis" occurred

in 1928-1930 when the solid silent screen had to be replaced by a material that would transmit sound as well as reflect light.

Early Sound and 3-D Screens

Some of the early sound screens were sad sheets indeed. Many were crudely perforated canvas silent screens of inherently low reflective power. The first "talkies" accordingly

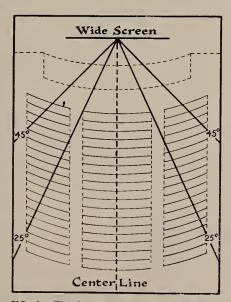


FIG. 1. The best seats in a motion-picture theatre are inside the area bounded by lines intersecting the center of the screen at 25-degree angles. No seats should be provided at angles greater than 45 degrees regardless of the size and aspect ratio of the screen.

looked as dark as the proverbial black cat at midnight and as coarse-textured as a newspaper halftone. The sound perforations frequently occupied fully 20% of the total screen area, reducing the reflectivity from 75% (good for those days) down to 60%. The perforations were so large and widely spaced as to be easily visible from the back rows of seats.

To paraphrase Santayana, an industry that does not know history is fated to repeat it; and the exhibition industry is no exception. Came the polarized-light 3-D crisis in 1952, and glib dealers in junk screens once again mesmerized theatre owners to the detriment of those manufacturers who have served the industry long and conscientiously. Smooth seamless aluminized screens had been available for many years, but an astonishingly large number of the nation's theatres displayed 3-D screens having "brutal' vertical seams.

As a projectionist, the writer cannot forget the remark made to him many years ago by an exhibitor who was bedazzled by low price tags. "The screen," he said when considering some improvements for his theatre, "is a *small matter*." Small matter, indeed!

The performance of the best projectors, lenses, and lamps go for naught when the screen is inferior. The most

superior camera work and film processing mean nothing when the screen is incapable of reflecting their pictorial qualities. The screen is an important link in a chain of highly technical processes; and its selection should rest ultimately upon the judgment of the only technical employee in the motion-picture theatre, the projectionist.

Projectionist Influence Great

Thanks to an alert interest in their profession and to timely reports appearing in the pages of IP, projectionists are in the best possible position to evaluate the worth of the equipment which affects the end result of their efforts — the picture and sound received by the eyes and ears of the audience.

Any intelligent projectionist knows that the optical function of a motion-picture screen is to reflect and distribute the focused image in a manner which preserves the contrast, color, and photographic detail of the film images, and without blemishes caused by conspicuous perforations, seams, wrinkles, or other sources of irregular light distribution.

The intelligent projectionist knows all this—yes,—but what about the intelligent exhibitor? He is not expected to have a first-hand acquaintance with all details of a technical process, but he can always rely upon his well-informed projectionists who are always glad to offer advice anent the suitability of the various components of projection-and-sound systems. The wise exhibitor finds out what is good and what is bad among the various brands and types of projectors, lamps, sound systems, and screens by consulting his projectionists before buying.

The use of larger screens in theatres for CinemaScope, VistaVision, and other forms of widescreen projection has created a crisis in regard to picture illumination. Aside from the desirability of light levels somewhat

higher than those that prevailed generally before the 1950's, a picture having an aspect ratio of 1.85/1 requires nearly 140% more light than a conventional 1.33/1 picture of the same height for the same picture brightness.

"Faster" coated lenses and, especially, the larger, more powerful arclamps presently available have come to the rescue of both the indoor widescreen theatre and the drive-in, where light levels have been manifestly inadequate. It is only natural that improvements in screens should have been made to add to picture brightness: but whereas screen pigments of maximum reflecting power have been utilized for a long time, permitting no further increase in overall reflectance, considerable effort has been expended in the area of directionalizing screen surfaces to concentrate the reflected light upon the viewing area.

The standard white matte screen surfaced with titanium dioxide, zinc sulfide, and magnesium carbonate has an overall, or integrated, reflectivity of about 89% when unperforated, or 82% when perforated with sound holes occupying 8% of the total screen surface. This is the highest reflectivity of any practicable type of screen surface, although the beaded and pearl types of surface are almost as bright (Table I).

The matte screen, however, is such a good diffuser of light that it reflects over an area much wider than that occupied by an audience. The light which is reflected into the extreme sides of an auditorium, or upon the walls, the floor of the stage, or the ceiling, is utterly wasted so far as the viewers are concerned.

Specular-Type Screens

Specular screens, notably the beaded and aluminum types, represent attempts to increase the apparent brightness of the picture as seen from the audience area by "robbing" the extreme side areas of light. The beaded screen is too directional, having a center-line reflectivity of 425% and only 47% at a 50-degree viewing angle, and it has the added disadvantage of a "fuzzy," grainy appearance and redirection of the light back toward the projectors. Because beaded screens send the light back toward the source, regardless of whether they are tilted or not, such screens cannot be used in theatres having downward projection angles.

The metallized, or aluminum-paint-

The metallized, or aluminum-painted, screen is available with more or less diffusive power, the less diffusive types being called "high-gain" screens because of center-line reflectivities of 300—400%. Aluminum screens reflect light mirrorwise, and hence give the best results in long, narrow theatres having a slight downward projection angle.

Viewed at angles of 45—50 degrees, the pictures on aluminum screens look excessively dim. The overall reflectivity of aluminum screens is only about 71% unperforated and 65% perforated, and they give pronounced "hotspot" effects, look grainy, give harsh, garish color reproduction. and show up wrinkles and seams embarrassingly well.

Aluminum Screen vs. Viewing Angle

As a guide to the proper use of aluminum screens, we suggest that highgain screens (center-line reflectivity of 380%) not be used where the maximum viewing angle is greater than 20°; that medium-gain screens (center-line reflectivity of 270% not be used where the maximum viewing angle exceeds 25°, and that low-gain screens (165% center-line reflectivity) not be used where viewing angles greater than 30° exist.

These recommendations take into account the lower intensity of projection illumination (foot-candles at screen) used where high-gain screens are installed.

The pearl screen is a white matte screen overpainted with "essence of pearl," a translucent, shiny substance made from fish scales. The pearl essence adds a specular component to an otherwise diffusive screen, increasing center-line reflectivity to 150% or more, but decreasing brightness below that of matte screens at viewing angles greater than about 28°.

Table II gives screen reflectivities

	PER CENT REFLECTANCE			
TYPE OF SCREEN SURFACE	Unperforated Perfora (8% lo			
Magnesium carbonate	98			
Matte white (Titanox)	89	82		
Glass-beaded	87	80		
Pearl	88	81		
Aluminum (paint or plastic)	71	65		

TABLE I Integrated reflectivities of screen surfaces.

Operational Note

A picture having an aspect ratio of 1.85/1 requires nearly 140% more light than a conventional 1.33/1 picture of the same height for the same picture brightness.

at different viewing angles from 0° (center line) to 50° .

It should be remembered that the choice seats in any motion-picture theatre lie within 25° of the center line on either side of the auditorium, while the seats outside this area, none of which should involve a viewing angle greater than 45 degrees, are second-best from the point of view of any patron (Fig. 1). We are therefore primarily interested in the reflectivity of screen surfaces over the range 0°—45°, and will tolerate a slight amount of falloff of light at viewing angles between 25° and 45°.

Lenticular Theory vs. Practice

The lenticular screen overcomes the problem of light falloff at the greater viewing angles by use of a specular surface (pearl or aluminum) which has been embossed with a large number of tiny cuplike depressions, or lenticules, rectangular in shape to provide a rectangular distribution of light (Fig. 2). Falloff is thus more rapid in the vertical direction than in the horizontal, which is as it should be.

In theory the lenticular screen is a logical development, but many serious problems of a practical nature remain to be solved before lenticulated screens of any type of surface can provide the smooth, even picture illumination of ordinary flat white screens.

Table III gives the horizontal and

vertical reflectivities of aluminum and pearl lenticulated screens presently on the market. Judged solely on the basis of these data, lenticular screens would appear to be superior to other types (even though the actually measured reflectance data given in Table III do not agree with manufacturers' claims of reflectivities in excess of 200% on the axis "with an amazing lack of falloff" at side viewing angles).

Calculation reveals that a theoretically perfect lenticulated screen of 100% integrated reflectivity can provide an apparent reflectivity of 220% with complete cutoff at 40°; and with a rectangular light distribution similar to that in use with commercial lenticulated screens, the 0°—40° apparent reflectivity approaches 250%.

No actual screen can even approach this theoretical lenticulated-screen performance; and, admittedly, no actual lenticular screen is so efficient as to give a complete cutoff of light at any viewing angle. (Consult Table III again.)

But the chief cause of dissatisfaction with the lenticular screens available at the present time lies in a quite different direction and involves optical difficulties created when the several lenticulated panels are joined together to produce theatre screens of the required large sizes.

Each tiny lenticule acts like a spherical mirror which reflects the light rays quite differently than does a plane surface. Since the high axial reflectance of lenticular screens (nearly twice that of perforated matte screens) depends upon the optical functioning of the individual lenticules, any slight interruptions in their continuity or minor alterations in

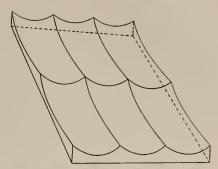


FIG. 2. Enlargement of lenticular-screen.

their depth and form perforce exert profound effects upon their reflection characteristics.

Seams where the panels are joined show up as black or gray lines (worse when the reflecting surface is aluminum), and the illuminated surface of a lenticular screen seldom looks uniformly bright but is marred by the slightly different reflectivities of the several panels. A reflection difference of 5% is easily visible, while differences of 10%—20% completely spoil the projection.

A "Spectra" Spot Meter or other brightness meter reading in foot-lamberts or apostilbs is ideal for measuring the reflection uniformity of motion-picture screens when precautions are taken to insure uniformity of illumination.

Lenticular Screen Development Needs

A tremendous amount of research and expense have admittedly been invested in the lenticular screen by a few manufacturers. Much more needs to be done, however, before this promising type of screen can furnish the seam-free, uniform-brightness characteristics which are absolutely mandatory in theatre projection.

The cost of lenticulated screens is (Continued on page 22)

ANGLE	SOLID		PERFORATED (8% LOSS)					
Degrees	MATTE	MATTE	MATTE PEARL BEADED		HI-GAIN	ALUMINUM MED-GAIN	LO-GAIN	
					III-GAIN	MEDFGAIN	LO-GAIN	
0	96	88	152	425	380	270	162	
5	96	88	147	350	360	260	157	
10	95	87	137	170	310	230	149	
15	94	86	123	110	250	193	136	
20	9 2	85	106	81	179	148	118	
25	90	83	94	64	122	110	99	
30	89	82	83	50	77	7 9	82	
35	88	81	74	45	49	58	67	
40	88	81	67	1գ14	34	45	56	
45	87	80	64	45	23	35	47	
50	87	80	62	47	16	26	37	

TABLE II: % reflectivities of screens from 0° to 50°.

ANGLE	ALUMINUM	SURFACE	PEARL SURFACE		
Degrees	Horizontal	Horizontal Vertical		Vertical	
0	193	193	152	152	
5	186	180	149	147	
10	173	16 ¹ 4	147	140	
15	162	141	145	125	
20	152	110	143	104	
25	1 ¹ 4 ¹ 4	80	142	87	
30	135	55	140	73	
35	123	36	133	64	
40	110	27	122	56	
45	96	21	110	52	
50	80	17	99	49	

TABLE III: % reflectivities of lenticulated screens.

The world's largest photographic show—Photokina in Cologne. Germany—was the setting for a summer-long demonstration of two fundamentally new projection adjuncts: a novel light source and its concomitant shutterless projector mechanism which is subject to either partial or complete automatic operation even from a remote station. Undoubtedly there will arise searching

questions relative to both these units, particularly the light source in terms of spectral characteristics, reliability, and output range (i. e., its comparison with the 60-ampere carbon arc, a low level indeed for today's large screen image and exacting color standards). Overall, however, this on-the-spot report by an outstanding European engineer and editor cannot fail to be of intense interest to the projection field.—J. J. F.

Radically New Light Source Spurs New Projector Design

By R. HOWARD CRICKS Consulting Engineer, London, England

MY CHIEF object in visiting Photokina was to see a new projection light source about which I had heard amazing accounts. The source in question is the Philips SPP discharge lamp, and it is no exaggeration to describe it as revolutionary.

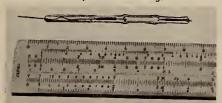
A tiny quartz tube like a clinical thermometer in appearance, only 3½ inches in length, yet I saw a well-lit CinemaScope picture 45 feet wide. At a current consumption of 800 watts the brightness was. I was told, 20 footlamberts. Its light output is claimed to be equal to that of a 60-amp. H. I. arc, representing an over-all efficiency five or six times greater.

The color of the light is nothing at all like that of the mercury lamps we have seen. It is perfectly white, not in any way lacking in red content, as was shown by the brilliant coloring of soldiers' red uniforms. It bears no resemblance whatever to the xenon lamp. The secret behind its high efficiency and the excellent color of its light is that instead of burning continuously it is fed from a pulsed supply, giving 72 flashes per second, or 3 per frame, each of only 2 or 3 milliseconds.

Three Distinct Advantages

This has three effects. First, the projector needs no shutter, with its 50% loss of light. Secondly, although the average load is only 800 watts, the peak

Philips SPP discharge lamp shown with holder is only 31/4 inches long.



loading is about 7 KW, and this high intensity not only produces an enormous light flux but gives light of the right color with a continuous spectrum instead of the line spectrum of most discharge lamps. Third, however bright the picture no flicker is discernible.

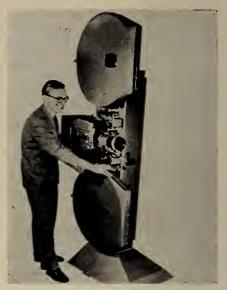
The gas pressure in operation is about 100 atmospheres, but the lamp is so small that there is no risk of explosion, and anyway it is completely enclosed during operation.

This unique light source has made possible the design of a completely new type of projector. Immediately behind the gate is a turret carrying two lamps: if the lamp in use should fail, the spare immediately drops into position, with only a momentary drop in picture brightness. The lamp is housed in a water-jacket, and behind it is a tiny cylindrical mirror; the condenser system employs a spherical and an aspherical condenser, giving so perfect a coverage of the aperture that the side-to-centre distribution on the screen is claimed to be 95%.

It is impossible for the flashing of the lamp to get out of phase with the film movement. It is triggered by three slots milled in the Maltese cross flywheel; a magnet head almost touching the flywheel feeds the pulses to a power unit which delivers the 400-volt pulses to the lamp.

And the cost? It is assertedly considerably less than the running costs of a carbon arc. The life of the lamp at full load is 33 hours, but if the loading is reduced to 600 watts, adequate for the smaller theatre, the life is doubled.

The FP 20S projector built around the new lamp has numerous points of novelty, notably that it has no shutter. The FP 20 projector is identical except that it carries an arclamp, and of course has a shutter—a double-speed, single-bladed shutter for efficiency.



Philips FP 20S shutterless projector which uses SPP discharge lamp. Note 6000-foot magazines.

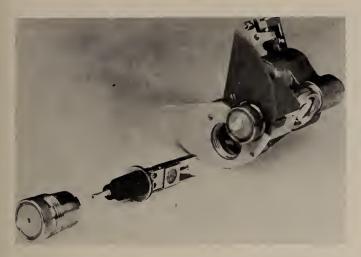
As with the Philips multi-purpose Todd-AO projector, the new machine has a long curved gate, and the value of this was shown by the rock-steady picture with pin-point sharpness. Threading is simplified by the fact that the take-off and take-up sprockets are built into the magazine traps and serve as trap rollers.

The projector is built not on the customary casting, but on a heavy pressed-steel box member. All shafts run on sealed ball-bearings, and the machine runs surprisingly easily. It is specifically built for the modern techniques. The lens mount can be removed and another mount, with a different focus lens, substituted in seconds, already focused. Just behind the gate is a slot for masks for different aperture sizes. Penthouse sound head is optional.

Remote Control or Automatic

But perhaps the most interesting mechanical feature of the projector is that it adapted to remote control or full automation. First, a single knob controls starting, changeover and stopping; the lamp is automatically switched on when the projector has attained speed, and is switched off when it stops.

Down in the auditorium is a small console. From here the complete working



Philips SPP discharge lamp in its housing, together with the turret carrying a spare lamp for instantaneous replacement.

of the projector can be controlled: switching, changeover, picture brightness, focus, framing and sound volume, as well as the theatre lights.

Inside the projector housing is built a completely automatic device consisting of a number of plastic discs driven by a small motor, and actuating contacts. From this control the whole of the performance can be operated automatically, including houselights, tabs or anything else, since the arrangement of contacts can be varied to suit individual requirements.

The whole trend of the projection equipment at Photokina was toward automation.

Other European Projectors

Another projector, the Ernemann, has remote-control systems for motor, change-over and focusing, and a contact on the lower fire trap which could be used to actuate the complete system. Under development is a so-called Projection Automaton, similar to the Projectomatic: a drum, triggered by the contact on the projector or by time switches carries adjustable pegs which operate any desired circuits.

The Askania projector, and three Italian machines—the Cinemeccanica, the

Xenon Lamp Light Source?

Over a period of ten years IP has been bombarded by manufacturers' requests that we recognize the efficacy of the Xenon (cold light) lamp for projection purposes. Admittedly, this light source has been greatly improved during the past five years; in fact, it is an ideal point-source of light, admirably suited for microphotography.

As to its suitability for general projection purposes, however, IP will withhold judgment pending receipt of several lamps now under extensive tests.

Pion, and the Fedi—had three-lens turrets and a slot behind the gate for inserting masks of various sizes. Magazines of 6000 feet capacity are general, so that a program could be run with only a couple of changeovers. [This should take a lot of doing in loading.—Ed., IP.]

I also saw the Cinemeccanica Victoria X projector for Todd-AO, which runs either 70mm. or 35mm. film. Like the Philips multi-purpose projector, its sprockets have four rows of teeth, and it has a curved gate. It has a three-lens turret, which will not however accommodate the huge A-O lens.

A coated arc mirror was shown by Zeiss-Ikon. By reflecting the light rays and allowing the heat rays to pass through it, it will, it is claimed, keep the film perfectly cool with a 65-amp arc. Most Continental manufacturers showed projectors fitted with the xenon lamp, which seems to be making progress over there

'Projection Differentials' ala Hue

A Dissent by ROBERT A. MITCHELL, Contributing Editor, IP

WITH DUE RESPECT to Dr. H. Hartridge, the colors given in the table on page 16 of the August issue of IP to show the effect upon hue of high and low projection illumination are, in my opinion, mostly incorrect.

It should be noted by projectionists that the three visual primaries (red, green, blue), located in the spectrum by the wavelengths 660 mu (and longer), 522 mu, and 465 mu, are the only colors which do not change in apparent hue with changes in brightness.

A color table which reflects my views is attached.

Dr. Hartridge neglected to mention total color-blindness and the two forms of red-green blindness. In one form the entire spectrum is visible, but with the red and green regions appearing as a sort of lemon-yellow and the cyan region as neutral gray. In the other form, the subject is blind to the red sprectral region, and the cyan region appears normally colored. In red-green blindness with a shortened spectrum, green is probably seen as green.

The mechanism of color vision and color-blindness has been adequately explained by J. Segal of the Centre National de la Recherche Scientifique in Paris.

Natural-color motion pictures will appear entirely lifelike to persons afflicted with partial color-blindness when the pictures appear lifelike to persons possessing full color discrimination, and only then. To date many American color processes have suffered from adherence to the fictitious color standards of the Standard Observer Spectrum and the Commission Internationale de l'Eclairage.

Corrected Table of Apparent Hue Shifts with Changes of Illumination Intensity

TOO MUCH	NORMAL COLOR	TOO LITTLE
Bright red	RED	Dark red
Bright orange	ORANGE	Rusty orange
Bright yellow	YELLOW	Olive-yellow
Canary yellow	YELLOW- GREEN	Olive-green
Bright green	GREEN	Deep green
Bright greenish		Deep bluish
blue	BLUE-GREEN	green
Bright blue	BLUE	Dark blue
Lavender-blue	VIOLET	Purplish violet
Red-lavender	PURPLE	Magenta-purple

The U.S. National Bureau of Standards reports:

"We know that the accepted (CIE) data do not apply to any one observer, and it is reasonably certain that the accepted data do not conform maximally to the population of observers with normal color vision in a statistical sense."

Several researchers have confirmed the writer's opinion that the spectrum locus is essentially straight between 660 mu and 522 mu, and between 522 mu and 465 mu. Furthermore, additive mixtures of 660 mu and 465 mu serve to produce the colors of the spectrum between 465 mu and the shortwave extreme in the violet, and the non-spectral purples as well.

Adherence to the Standard Observer-CIE color specifications produces serious color distortion in the blue-to-violet region as reproduced by color motion pictures and television. These errors far outweigh the slight distortions of color produced by either insufficient or excessive projection illumination.

In the SPOTLIGHT

STANDING on the pier and watching the boat sail out need not be the experience of the organized craft if it takes a good, long and hard look at the onsurge of tape recording and reproduction, aural and visual, and thus sidestep the debacle which overtook them in the formative years of TV when a rank nonshow business entry usurped their rightful functions.

Two recent developments would seem to indicate that the projectionist craft is now alive and response to its needs in the area of audio-visual use of tape not only in the entertainment field but in the vastly larger non-theatrical field—industrial and educational utilization of tape.

In New York 20-odd members of Local Union 306 have embarked upon an intensive course of training in tape practices sponsored by RCA Institutes, Inc., primary agent in the training of countless hundreds of radio and TV technicans. Extended over a period of weeks running into late Spring next, those who attain a passing grade in the course will be awarded a certificate of proficiency in this new technique.

Craft Interest Nation-Wide

On the West Coast a similar group from Studio Projectionists Local Union 165 are embarked upon a similar course of training sponsored by the University of Southern California.

Such activity can only redound to the benefit of the craft at large, needing only a keener interest and participation in such programs by many other craft units between New York and California. The spectacle of a non-show business group which may be classified properly as electricians moving in and taking over camera work and the like in TV studios need not be repeated if there be a wide-spread and intensive effort by projectionist units.

• Tobe A. Petre, member of Toledo Local 228, now convalescing in St. Petersburg, Fla., extend his heartfelt thanks through the medium of this department to the many IA men who have written to him in response to an item we printed several months ago. We mentioned that Petre missed the companionship of his fellow craftsmen and suggested that our

readers write him and "give him a much-needed lift."

In a recent letter to this department Petre states that the deluge of mail he received from all parts of the country has given him a new lease on life, and he has hopes of once again working at the craft. Letters from John Shuff, IA 8th vice-president; Bill Brown, Local 626, Nashville, Tenn.; Gil Light and Carl Rousch, Local 199, Detroit, Mich., and many others too numerous to mention here contributed greatly to Petre's determination to regain his health.

• MEMO: Department of Sound from Which Emanates Not a Sound. Following is a headline in the magazine Business Week, which by no extravagance of wishful thinking may be indexed as a pro-Union publication:

NLRB is Moving Toward A Deeper Involvement in Labor Relations which caps pronouncement of solemn portent even for those members of Labor Unions who read as they run. We're talking now about those guys who make the decisions.

IP is all for a "deeper involvement" in Union affairs by NLRB members—IF somebody who holds a Union card has even a pip-squeak voice in determining who that member shall be.

- Jack McCullough is now rounding out his 36th consecutive year as technical supervisor of all film and exchange activities at the Motion Picture Producers Association. Jack is an unreconstructed projectionist for the same number of years as mentioned above. His work in his specialty has been outstanding and has been widely praised and copied world-wide.
- The 1958 Fall meeting of the New York State Association of Motion Picture Projectionists was held on October 20 at the Lakewood Rod and Gun Club, in Jamestown, N. Y. As usual, a varied program was offered, including several top-flight technical presentations, one by Bill Ingram of Rochester Local 253 being tops.

The Association wishes to make public expression of its thanks to Lorraine Carbon Co., Eastman Kodak Co., and National Carbon Co. for their substantial aid in staging the meeting.

Officers of the Association for the next two years (George Raaflaub of Local 376, Syracuse, declining re-election as president to succeed himself) are: Frank Larham, Geneva, president; Raaflaub, together with John Short, Corning, and

ADDENDA: MORE PROJECTION STALWARTS AT 25-30 CLUB FALL GALA

TOP PHOTO (clockwise): Abe Kessler, L. U. 306; Irving Merkur, bigwig at Reeves Sound Studios and manufacturer of the Ace, finest butt splicer; Bob Goldblatt, honorary member of the Club and 1st president of L. U. 306; J. Devereaux, Lorraine Carbons; Clarence Ashcraft, 50,000-lumen arclamp guy; S. Stampler and John Finnerty, Lorraine; and Gene Picker, vice-president, Loew's, Inc.

BOTTOM PHOTO (clockwise): Charlie Talley, projection chief at New York's famed Roxy Theatre; Ben Olevsky, boss of world's largest theatre, Radio City Music Hall; John Rollman, Rivoli Theatre; Jack Winick, L. U. 306; Morris Rotker, ex-prexy 25-30





Club and toastmaster; C. Silverblatt, L. U. 181, Baltimore, Md.; IP's James J. Finn; John Kohler, projection chief, Loew's Theatres, and his assistant, John Cassaro; and Gio Gagliardi, Warner Bros.

Fred Closser, Rochester, as vice-presidents; the perennial secretary-treasurer and the fellow who does all the "bull" work, Charlie Wheeler, Geneva; executive board: George Robinson and Fred Young. Niagara Falls; Walter Scarfe, Syracuse; Don Lutton, Jamestown, and Elliott Hazen, Hornell. Sergeant-at-arms will be Walter Knopf, Rochester.

- In a photo stemming from the recent 25-30 Club party in N. Y. City and printed in IP last month (p. 14) the likeness of William C. Anderson, president of the Club, was inadvertently tagged with Edward Dougherty's name. This is one gaff we seldom make, and we trust that Bill Anderson didn't mind too much.
- Gerald L. Hoover, Jr., member of Minneapolis Local 219, is now Cpl. Hoover of the U. S. Army, stationed in Mannheim, Germany. He is with the Signal Corp, 545 Company, working as



a radio repairman by day and serving as a projectionist in the evenings at the depot theatre.

Bell Labs' 1st Transistor Step

There had to be germanium of flawless structure and unprecedented purity. This was obtained by growng large single crystals—and creating the "zone refining" technique to purify them to one harmful part in ten billion!

Basis of Ashcraft Micronic Arc Control

Editor, IP: Would you explain briefly the underlying basis for and practical operation of the Micronic Detector Unit which is employed as an arc-gap control on the Ashcraft Super Cinex projection lamp.—Rene C. Lucien, Ciudad Trujillo, Dominica.

B ASIC principles of the Micronic Detector Unit are illustrated in Fig. 1. Shown are the carbon crater, the 18-inch reflector, the projector aperture, and the relative position of the small plano reflector which diverts a small portion of the main light beam at right angles to the optical axis of the lamp for operation of the Control.

The reflected light beam originates approximately 2 inches from the edge of the elliptical reflector, on the operating side of the lamp. It is then picked up by the small plano reflector and projected onto the solar cell of the Detector. Since the light originates from the carbon crater, the beam actually reflects an image of the crater which is magnified to a size of about 6 times the actual crater diameter and moves 6 times as fast as the forward motion of the crater.

Control Zone 0.005 Inch

For instance, if the crater moves 1/32 inch closer to the main reflector, the image will move 6/32 inch to the right from position A to B — much more movement than is necessary for the requirements of the Control. The actual movement of the crater and image is measured in thousandths of an inch. It

is estimated that the Control holds the crater position to within plus or minus 0.005 inch.

When the image is correctly adjusted on the Detector screen surface, the elongated image of the crater area will appear white and of high intensity. To the right of this brilliant area the reflected light will be bluish and of a comparatively low light intensity; to the left, the light will be reddish and of a low light intensity.

The bluish light is reflected from the ineandescent gas emerging from the crater, the brilliant white is the light from the crater itself, and the reddish

Light-Sensitive Cell Action

The optics of the Micronic unit render

mechanism.

possible precise control of the aperture spot, which in turn controls both the screen light intensity and the distribution of light over the screen surface.

light is from the carbon shell. As the

three zones appear from right to left

on the Detector screen bluish, white, and red—they are reversed from those

viewed through the observation port of

the lamphouse for the same reason that

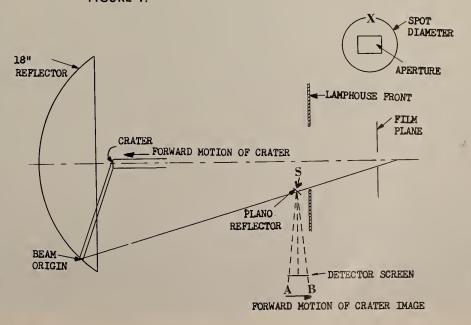
the tail-flame of the arc always appears below the aperture of the projector

In Fig. 1 the circle to the right, enclosing the aperture rectangle, represents the aperture spot and the point X where the spot diameter would be controlled if it were practical to place the light-sensitive cell at that particular position—which, of course, it is not, due to the extremely intense heat.

At point X, it can clearly be seen that the slightest enlargement of the spot would bring the light-sensitive cell within the brilliant circle of light, thus creating an abundance of electrical energy for the control of the forward movement of the carbon crater.

By placing the light-sensitive cell at the position S and using a very small plano reflector which reflects only a minute portion of the total reflected light beam of the arc, and, in addition, by obscuring the majority of the reflected light beam by the scanner plate and allowing the light to pass only through the small 0.040-inch diameter hole, the entire Detector unit is thoroughly protected from any possible heat damage and still performs the same function as if placed at the edge of the aperture spot itself.

FIGURE 1.





An old family custom...

Cows milked, chickens fed How about going to the movies?

Then comes the vital question: "What's playing?" If it's one of the better pictures, watch them line up at the box-office!

Better technics help make good pictures better. That's why close co-operation with the Eastman Technical Service for Motion Picture Film pays off. Call upon it with questions of production, processing, distribution, and projection. Offices located strategically. Inquiries invited

Motion Picture Film Department
EASTMAN KODAK COMPANY
Rochester 4, N.Y.

East Coast Division 342 Madison Ave. New York 17, N.Y.

Midwest Division 130 East Randolph Drive Chicago 1, III.

West Coast Division 6706 Santa Monica Blvd. Hollywood 38, Calif.





AUDIO - VISUAL

EDUCATIONAL · INDUSTRIAL · COMMERCIAL

A TEACHER can never truly teach unless he still is learning himself. A lamp can never light another lamp unless it continues to burn its own flame. The teacher who has come to the end of his subject, who has no living traffic with his knowledge but merely repeats his lessons to his students, can only lead their minds—he cannot quicken them. Truth must not only inform but must also inspire. If the inspiration dies out and the information only accumulates, then truth loses its infinity. The greater part of our learning in the schools has been a waste because . . . the subjects taught are like dead specimens of once living things with which one has learned acquaintance but no real communication of life RABRINDANATH TAGORE.

New Filmstrip Sound For The Old

That Mighty Mite, Mag Tape, Does Job Easily and Well

THE audio-visual aids available to the instructor have been augmented significantly in recent years with the steady improvement in magnetic recording and the portable tape equipment. Many libraries contain filmstrips which were purchased with an accompanying record of the disc type. Not only will the record suffer by comparison with newer issues, but it will frequently be found with damaged grooves, "repeats," and extraneous

noises. How such surviving filmstrips may be brought back to full usefulness is considered herein.

The first step is the transcription of the existing record to a printed script, preferably typed. Editorial correction and rephrasing, which can add much to the new commentary, should be done at this time.

Classes in the production of audio-visual aids can obtain useful practice in the recording of new tapes for the sound accompaniment of filmstrips. Certainly, we should urge that all the steps necessary be performed by persons either trained in good recording techniques or those who are working under the supervision of experienced people.

Separate Tape for Sound

It is wise to record the speech portion of the new script on a tape by itself, with suitable effect sounds or any music desired kept to a separate tape. The reason for this is not so obvious until final mixing of the music, effects and speech is undertaken.

The best type of equipment for such mixing work will provide at least two input channels to the recording head, with instant monitoring provided by a special playback head shortly behind the recording point. If the final result is not what is desired, it is no great loss; it may be erased and done over until the smoothness required is obtained.

In selecting the signal note to

By JOSEPH P. HOLT

be used by the projector operator for the transport of the film to the next picture frame, there exists a great latitude of preference. Some experimenters seem to lean to the use of the toy "cricket chirp" for this audible signal, but there are other simple sources of noises.

The writer believes the simplest and most pleasing sound can be obtained from the ordinary single-tone door chime. Such a device operates from the familiar bell-ringing transformer and will provide uniform sounds which cannot easily be confused with others.

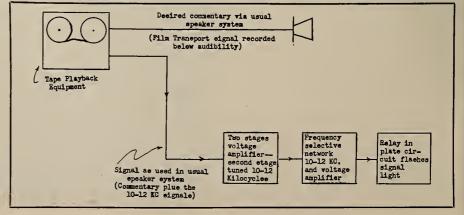
Practical Signal Suggestion

Parenthetically, to those who may have departments of research the writer commends some work in the field of transport signals which will be audible *only* to the operator of the projector. Although several inexpensive methods suggest themselves, no professional equipment, so far as he knows, contains provision for such an operational feature.

It would be practical to record a signal of suitable level at the upper limit of the equipment in use. In most devices this will lie slightly above 10 kilocycles at ordinary tape speeds. Once a level is established which is not readily audible, it is not difficult to establish a second channel which will be tuned to the selected signal. The output stage of frequency-selecting network may contain a relay which will operate a signal light visible only to the projector operator, and thus cue him on the changing of the picture without distracting the other view-

But to return to the problem of

Block diagram illustrates the path of signals and the type circuits required to accomplish transport signals of which only the projector operator is aware.



creating new script tapes and their use on a day-by-day basis. It would be good practice to provide a copy of the perfected tape for storage in the A-V library. With all the advantages of tape recordings, let it be recognized that tapes can be damaged by many different causes, some of which can be controlled by the user.

Recording Level Important

Recording level is important in controlling cross-talk or intermodulation between adjacent layers of tape. This precaution consists merely of recording all tapes at levels somewhat below the overmodulation point; in fact, the lowest level consistent with good signal-to-noise ratio is preferable.

Again, extensive damage may be done by storing the tape in a "tootight" condition. Most equipment will wind all tape at the proper tension for good storage when operating in the "play" or "record" position. Unfortunately, most users do not leave the tape in this relatively loosely-wound condition, but rewind the reel at a high speed provided on most equipment. If the reel is left too tightly wound while stored under widely varying temperatures, it is almost certain to suffer serious damage.

So, let personnel using tapes become accustomed to leaving the tape "end out" just as the machine delivers it from a normal play. The tape may be rewound at high speed immediately before each use.

Proper Storage a 'Must'

In storing tape, much depends upon the nature of the base. Older paper-base tapes will not stand much variation in temperature or moisture, but the most expensive Mylar bases will stand much abuse in this respect. But to play it safe, all tapes should be stored where the temperature and humidity vary as little as possible.

If steel cans such as are used for storing film are available, it would be wise to use them for tapes con-

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Optical Prints From a Magnetic Soundtrack

If SEVERAL prints of a film are wanted, it is just as inexpensive, in terms of additional costs, to have optical photographic sound prints made from magnetic sound masters as it is to make magnetic duplicates.

A number of laboratories are equipped to make optical photographic prints from magnetic-striped originals without the necessity of making an optical photographic master sound track. The cost, in most cases, is about the same per foot as it would be if a magnetic stripe were being added to the film.

For certain uses, optical photographic prints have some advantages over the magnetic. A photographic sound track will last the life of the film and cannot be damaged through cleaning or preservative film treatment. It can be played on any 16-mm sound projector, and there is no danger of an accidental erasure of the sound track.

Optical photographic prints can be made from original magnetic sound films with the track recorded on the film; or they can be made from original films and separate magnetic tracks. Some laboratories prefer the magnetic track as a separate item because there is then less danger of scratching the picture original inasmuch as it is used only to print the picture and need not be re-run in order to print the sound. (Laboratory machinery for re-recording sound is not as gentle in handling film as that used for printing the picture.)

To achieve the highest possible print quality, special care should be used in making magnetic films from which optical photographic prints are to be made. Sub-standard portions of the sound cannot be rerecorded and improved, as in the case of magnetic sound films.

sidered especially valuable or those which are to be stored for long periods of time. It is good practice to place a sheet of cellulose material in each can to act as a moisture absorbent.

IMPORTANT: Tapes should not be stored near *any* type of electrical equipment. Actually, no type of electrical machinery comes to mind which does not present some hazard

to magnetic recordings.

Surely everyone can visualize the potential hazard from most electrical devices; yet we call to mind the experience of the owner of the extensive pre-recorded library which was stored near the control room of the elevator system in a large apartment house. The owner shortly had the finest collection of weird buzzes, clicks and hisses inter-

Reflections: A-V Notes

THE VERY informative piece by Joseph Holt in IP for October ("Notes on Filmstrip technique," p. 15) might have cautioned repairers of filmstrips to cut the mending tape in the *exact middle* of the framelines.

Experience at an experimental center A-V Library, a State adjunct which furnishes films, filmstrips and slides to schools in the area, indicates that the use of Mylar tape for patching often seriously mars the pictures by the presence of minute air bubbles between the film and the tape. Great care must be exercised to remove these.

Actually, there is little excuse for tearing a filmstrip in the picture portion, though the ends of the strips unavoidably get "chewed up" through constant repeated use. Manufacturers of these strips should be induced to employ much longer leaders and runouts; and

until they do, Mr. Holt's suggestion should be religiously followed.

16-mm Projector Movements

I note the item on p. 17 about the Kodak Pageant projectors. These, in my opinion, are excellent 16-mm machines. The only trouble with most 16-mm projectors employing 5:1 shuttle movements is that they are a bit too noisy. The 5:1 sprocket movements are quiet, and so is the 3:1 claw movement which Keystone has used in many of their models.

In fact, classroom projection would be improved if the extremely quiet Keystone type of shuttle were used, even though a small amount of screen brightness has to be sacrificed. It is very disconcerting to listen to the sound reproduction through the whir of a noisy projector.

Passing note: Station WLBZ-TV in Bangor, Maine, has two new General Precision Labs 16-mm TV projectors—really beauts!—NILS OMO.

spersed with his expensive recordings to be found anywhere!

The user of magnetic tapes has many pitfalls to avoid; but we contend that the advantages enumerated herein make it possible to keep filmstrip commentary abreast of the very latest information in the field, thus rendering the filmstrip useful over a much longer period of time than was heretofore possible.

Craig 4 x 6 Projecto-Editor

THIS EDITOR is for 16-mm film, sound or silent, with a 4 x 6 format. Its capacity is dependent upon accessory rewinds. Weighing under eight pounds, the unit has a rugged, diecast body with a two-tone brown wrinkle finish. The hood is of



Craig 4 x 6 Projecto-Editor. (A division of Kalart Company, Plainville, Conn.).

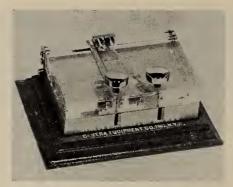
wrinkle-finished sheetmetal. It has a built-in frame marker, and provides separate focusing and frame adjustment. This is a Kalart product.

The F:2.8 triplet lens provides brilliant pictures with maximum edge-to-edge sharpness. Light intensity of 20 ft.-candles on the screen permits viewing without darkening the room. The lamp is a G. E. 75-watt PH75T8/106 or its equivalent.

'Clear Vision' Tape Splicers

A SERIES of newly designed film splicers designed for use with film sizes ranging from 8 mm to 70 mm and including all types of film—safety, nitrate, DuPont Cronar—has been produced by Ace Electric Mfg. Co. (1458 Shakespeare Ave., Bronx, 52, N. Y.) under the trade name of Clear Vision. These splicers use no cement or heat, the splicing medium being perforated Mylar tape in either clear, white or yellow shades.

The splicers are completely nonmagnetic in construction and cannot harm coatings or stripes. Strong but or lap splices, straight or diag-



The Ace "Clear Vision" film splicer which utilizes Mylar tape for splicing all sizes from 8- to 70-mm, lap or butt, straight or diagonal.

onal, may be made on the same splicer. Clear visibility is provided

throughout the splicing operation. Eight pins on springs, four on each side, hold the film securely to the plate. The center pins are adjustable from 70 mm down to 8 mm.

The tape splices, which do not show on the screen, will not break or come apart during projection, are not affected by high relative humidity, permit film repair without the loss of a single frame, are unaffected by film cleaning solutions, and permit repair, even replacement, of broken perforations. The units have self-sharpening, lifetime knives.

General sales agent for the units is Camera Equipment Co., 315 West 43rd St., New York City.

Maximum Life From Projection Bulbs

By H. J. HANBURY

Photolamp Division
Westinghouse Electric Corp.

O NE of the most common causes of early failure of projection lamps is rough handling. Because these lamps have an extremely high light output, and since this light must be positioned extremely accurately to obtain maximum screen brightness, the filaments are complex and very closely spaced. As a result, they are easily damaged by rough use.

When storing a spare lamp in the projector case, be sure it is well cushioned and protected by the original packaging material or an equivalent substitute. A lamp which has been dropped or subjected to severe shock, will frequently fail when turned on.

Never move the projector while the lamp is burning (except for normal tilting adjustment) or place the pro-



The Kodak 500-watt slide projector is a "big brother" to the popular 300 model. It can be used with the Readymatic Changer and can screen 35-mm, Bantam, or the new 38-mm "super" slides with no condenser-system change. jector in an abnormal position. Westinghouse projection lamps, for example, use the "floating bridge" filament construction. This permits the filament to expand when heated and to contract when cooled without the coils buckling or the filaments becoming distorted.

Turn the projector off when changing films, making lengthy adjustments, or leaving the room temporarily.

Proper Ventilation Vital

Many projection lamps require the use of forced cooling. It is important that projectors using a blower system be in proper operating condition with no obstructions to the air intake system. Be sure the airintake opening is not obstructed. The blower in a projector is primarily for the purpose of protecting the lamp from overheating. The film is protected from excessive temperature by a heat filter in the condenser optical system. The reflecting mirror in the lamp housing must be properly focused, otherwise the mirror may cause the glass bulb to overheat.

Observe Recommended Ratings

An important factor is voltage. Most projection lamps made today have a range voltage of 115-120 volts. If voltage on the line is higher than the lamp rating, bulb life will be materially shortened, although light intensity will be greater. However, if the voltage is too low, lamp life will be increased but only at a sacrifice in screen brightness.

Lamps in special high-voltage ranges are made for use in foreign countries where line voltage may differ.

In sound projectors, no deviation

should be made from the recommended sound reproducer lamp. To use a lamp of a different volt-ampere rating will result in inferior reproduction and may cause a burnout.

Use of a larger bulb than the manufacturer recommends in the vain hope of obtaining a brighter picture likely will result in either or both of two things: lamp burnout or ruined film.

Because of their extreme brightness, projection lamps have a useful life span of from 10 to 50 hours, with an average of about 25 hours. Watch carefully for any sign of deterioration. Best bet: always have at least two spares on hand.

Webster (Racine) Ekotape

FEATURING AN A-V control center, Webster Electrical (Racine) demonstrated its new Ekotape 310 tape recorder with two recording heads for special audio-visual application. The trend toward automation in the educational and sales field occasioned this new A-V model, which makes it possible to record sales or educational messages and be assured of perfect sound-slide synchronization with any automatic slide projector.

Here's how it works: The Model 310 eliminates verbal instructions or tone signals to indicate a slide change. The slides are changed automatically as a result of an electrical impulse passed from the Ekotape unit to a solenoid attachment on the slide projector. As the recording is made, the operator simply presses a button on the A-V control center which applies a signal to the second track of the tape. When played back,



Shown is the Ekotape 310, by Webster, ready to operate with projector containing an automatic slide changer. One channel of tape carries the voice; the other transmits an electrical impulse which activates the slide changer. Impulse is put on tape in advance by pressing control button at upper right.



BalCOLD Reflectors



Super Cinephor Projection Lenses

HERE'S THE WAY TO BEAT TV!



CinemaScope Lenses



...and only B&L gives you the complete system to do it!

How to get people off their divans and into your theatre? Give them movie thrills they can never get, for free or for fee, on TV. Larger-thanlife pictures, so vivid, so easy to enjoy that your patrons can't be satisfied with anything less.

That's where B&L image quality enters your profit picture. Because only B&L gives you a complete, balanced optical system—BalCOLD reflector, Super Cinephor lens, CinemaScope lens—all perfectly matched to fill the screen with today's clearest, sharpest pictures.

Today, it's B&L all the way. Most of the movies you show are filmed with B&L lenses. To show them at their best, more and more indoor and drive-in theatres are standardizing on B&L projection optical systems. It'll pay you to find out why.



this signal provides the impulse to the projector which changes the slide. The final product brings about exact synchronization automatically, allowing the instructor to stand beside the screen and point out items for emphasis. (A special foot pedal accessory is available which can stop and start the recorded message at any time, allowing for personal messages, if required.)

Extremely Facile Unit

Standard visual education slides available from various foundations are generally accompanied by scripts to be read by instructors. The Ekotape 310 enables an instructor to transcribe the script on tape, use the A-V control center for proper timing of slide changes, and put in local commentaries which might be useful to students.

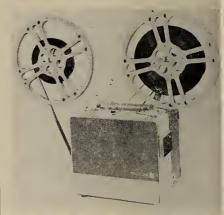
Specifications for the Ekotape 310 include: V-U Meter for recording; 2-speed recorder (3¾" and 7½" per second); 12-watt amplifier; tape-out switch; program selection finder; heavy-duty speaker; frequency response—30 to 15,000 cps; record knob safety interlock features; separate erase for commentary and signal.

BUY U. S. SAVINGS BONDS

TecLite' 16-mm Sound Projector

TECLITE is the designation of a new
16-mm sound motion-picture projector offered by Technical Service, Inc.,
Livonia, Mich. One of the lightestweight professional projectors available, it is less than 30 pounds. It

runs on either D.C. or A.C. current,



The new Teclite 16-mm sound projector which, complete, weighs less than 30 pounds.

and the compact single-case unit uses an 8-inch speaker—detachable, if desired—which responds to a newly-designed 15-watt A.C.-D.C. amplifier.

Mobility an Important Factor

A straightline optical system, coupled to an efficient cooling system, allows use of 1200-watt lamps for long throws or for specially big film presentations. Two-speed operation, plus reverse, is standard. External dimensions of the Teclite are only 14 inches by 113% inches by 13 inches. The light weight and portability of the unit make it very suitable for both industrial and educational applications.

Kunsman Succeeds Cahill as President of RCA Service

Donald H. Kunsman has succeeded Edward C. Cahill as president of RCA Service Co. Best known for its TV servicing, RCA also services theatre, industrial, data reduction, mobile and radiomarine communications equipment, in addition to providing technical help to U.S. Armed Forces world-wide.

Cahill will continue as a special consultant. He has been president of RCA Service Co. since its inception in 1943, and under his leadership the company has grown from a handful of technicians to an organization of 12,000 technicians, engineers and scientists. He is well-known in the theatre field, having started as an RCA theatre serviceman in the Chicago area 30 years ago.

Kunsman has served as vice-president and operations manager since 1957.



'Ultramatic' Projector by Harwald

A NEW fully encased 16-mm sound projector, named the Ultramatic is offered by the Harwald Co., Evanston, Ill. Being self-contained and fully encased the unit is always set up and ready to run. The unit holds the stand, screen, projector, films, speaker and cord; and the easy-roll casters insure complete mobility. The case eliminates projector noise and, being locked, is tamper-proof.

The projector is equipped with



The Harwald Ultramatic projector.

safety trips which provide complete film protection. Filtered air keeps the mechanism clean and the film dust-free. Price: \$695.

Dr. Maulbetsch Forms Lerma

Dr. John L. Maulbetsch, formerly vicepresident and chief designer for Kollmorgen Optical Corp. and a frequent contributor to IP columns, is now president of Lerma Engineering Corp., Northampton, Mass. Associated with him is John L. Lerse, who formerly was chief development engineer for Kollmorgen.

Working as a team, the above named have been responsible for the design and manufacture of many highly successful remote viewing instruments, particularly for the nuclear field.

Lerma will design and manufacture

Lerma will design and manufacture remote viewing instruments, special periscopes, special borescopes, optical tooling, inspection devices, optical systems, and precision optics.

Record Cinemiracle Footage

More than 2 million feet of Eastman color negative was consumed by Cinemiracle cameras during the production of "Windjammer" (I.P. for May, p. 3). This record footage was required because the Cinemiracle cameras utilize three separate negatives for each take.



Your SIMPLEX Projector Mechanism represents a priccless investment. You bought it after long, careful study because you recognized it as the finest projector on the market.

Don't take chances with such an investment — the very success of your theatre depends upon its performance! When spare parts are necessary, insist on the best — insist on SIMPLEX parts!

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Scheduling Practices for A-V Equipment

SCHOOLS use a wide variety of practices in scheduling the use of audio-visual equipment. The most common practice seems to be a schedule with spaces for time sufficient for one day. Schedules may be prepared with several days on one sheet, or each sheet may represent a separate day. Essentially, however, they are as shown in the accompanying illustration.

The format shown here is an excerpt from an 89-page handbook designed by the A-V Section of the San Diego, Calif., school system. Sections in this thumb-indexed, 8½ x 11-inch, loose-leaf handbook are: General Introduction, Audio Materials, Visual Materials, Audio-Visual Materials, and Appendix.

The handbook is a comprehensive compendium of accurate information, and is one of the best A-V aids in the teaching field.

General Considerations

The general considerations to be kept in mind in setting up any schedule might be: Are time limts clearly

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designated? Is all equipment available on the sign-up board? Is there any possibility of duplication if directions are followed? Is the reservation sheet as simple and plain as possible?

Schools that arrange to have student A-V assistants also have request sheets or cards for obtaining available rooms for folk-dancing, projection use, or listening activities. Placing record players or other pieces of equipment at spaced intervals through the school for adjacent rooms to share. In secondary schools scheduling classrooms equipped with room darkening devices for use during that teacher's preparation period. Keeping a 3 x 5 card file of projection aids used with annotation of content.

SAN DIEGO CITY SCHOOLS.

- School

Be Sure to Enter your Room Number (or Initial) to Reserve

Rooms and Audio-Visual	Period 1 or	Period 2 or	Period 3 or	Period h or	Period 5 or	Period 6 or	After School
Equipment Items	9:00	10:00	11:00	12:00	1:00	2100	
Auditorium							
Room 102			i				
M.P. Projector #1							
M.P. Projector #2			i_		ļļ		
Projector F.S. #1				<u> </u>			
Projector F.S. #2		11					
Record Player #1							
Record Player #2			<u> </u>				
Radio							
Television							
Autoharp							
Brock Bells							

INDICATE where you want equipment placed, but be sure also to reserve that place if it is not your regular classroom.

By expanding this format, one week, two weeks or more may be set up on one master schedule including available rooms and equipment having multiple use. Some schools prefer to have separate schedules for each room or item of equipment to be reserved.

special help. However, care should be exerced to ensure these students not being called out of class.

Aids to scheduling practiced in various schools include: Setting up each piece of equipment on carts or tables with casters, to make transportation use more simple. Establishing fixed times for using some

Eastman Kodak Sales Up

Sales of Eastman Kodak Co. in the 12 weeks ended Sept. 7 continued slightly ahead of last year's sales, while quarterly earnings moved above the 1957 level for the first time this year.

Consolidated sales in the quarter were \$197,385,339, about two per cent more than the \$193,494,157 of the third 1957 quarter. Net earnings in the period were \$26,299,098, about three per cent greater than the \$25,434,611 earnings of the same quarter of last year.

Set Main Feature at 8:40

Century Theatres, which had been testing showing of main features at 8:40 p.m. in about a third of its houses, on Oct. 29 put that time schedule into effect in all of its Brooklyn and Long Island (N. Y.) theatres.

Plan permits single-feature fans to see the top attraction at a convenient hour, while those wishing to see two pictures are assured of a complete show as late as 8:40. Policy is to be in effect every evening, except Saturdays.

The plan was devised because of persistent complaints from moviegoers and organized labor that irregular starting times effected adversely attendance.

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MANUAL OF PRACTICAL PROJECTION



New Screen Sensations Are Cleverly Spoofed

His imagination spurred by recent reports of "Scentovision" and "Movies in the Round" (360 degree surrounds), Ralph Schoenstein set down the appended flight of fancy for the weekly Saturday Review. Main concern of movie people: it might happen!

I recently attended a demonstration of Rotundavision, the revolutionary movie process that is the last word in cinematographic production and presentation. Never before has the viewer been so absorbed and assimilated by the motion picture experience.

This brilliant conception daringly disposes of all conventional methods and rockets the moviegoer to celluloid sublimity by giving him the thrilling realism of *two* new dimensions, *three* new senses, perpetual motion, and nausea.

I knew that the new process was boldly different when I was strapped into a dentist's chair and immediately flipped on my back so that I was looking up at a huge rotunda. Electrodes were strapped to my wrists, a rubber tube was inserted in my left nostril, and the motor under my chair was started in neutral.

Transit Into Idiocy

Naked ushers from the Actors Studio then gave me the opportunity to take out flight insurance and to leave my eyes to a bank of my choice. As soon as the demonstration began and I felt nausea sneak in under the credits, I knew it was now impossible to put the viewer any deeper into the movie and still keep him conscious.

The drama used to show off this process must be suitably gigantic, and the one I saw was "The Story of Everything" (a James Jones treatment of the first 16 volumes of the Encyclopaedia Britannica). Wisely, the producers began with the creation and ended with the sacking of Vienna.



I am happy to report that the creation scene came off with primordial splendor. To give the viewer the feeling of time, space, and motion, the focus was blurred, the clocks were set back, and the chairs were put into orbit. To give the viewer the never-before-experienced senses of smell, taste, and touch, molten lava was sprayed about the theatre, small rocks fell from the rotunda, and Turkish incense was pumped through the left nostril tube.

Activated Emotional Electrodes

The electrodes were activated so that the heartbeat was regulated by the manager, who could then induce the proper emotional response to each stirring scene. Because the viewer's heart was now under the direct control of the manager, artificial and obstrusive music was not needed to create mood in the film.

Three critics didn't survive the screening; but the producer insisted that they were "fighting the picture".

[NOTE: The foregoing, magnificant exposition of idiocy, is complemented by the following excerpt from the "Monthly Chat" which appeared in IP for July:

New "Standards" Daily

Almost any day now one may expect some producer to announce that his "standard" film size will be 63.45-mm wide, will have 5½ sprocket perforations per frame, will show pictures having an aspect ratio of 3.14, and will have seven sound tracks—four will be magnetic and three optical.]



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LENTICULATED SCREENS?

(Continued from page 7)

necessarily high, inasmuch as the manufacturing process requires several types of embossing rollers to accommodate the different projection angles encountered in different theatres. In its present imperfect stage of development, the lenticular screen, in the writer's opinion, is a costly gamble for the theatre-owner.

The white matte screen remains the most reliable type, and certainly the best for wide theatres. Its surface characteristics provide the widest coverage, the smoothest illumination, the truest color reproduction, and the highest visibility of fine photographic detail. The pearl screen is a modern type which provides matte-screen performance with higher axial reflectivity for medium-wide theatres, and without the "hot spot" characteristic of aluminum screens.

Long theatres still may depend up-

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on the aluminum screen, however; but the best results picture-wise are obtained with low-gain, rather than with high-gain, surfaces. There is some evidence that pictorial contrasts are enhanced by aluminum screens.

SCIENCE NOTES

AERIAL FILM DIAGNOSIS of certain cereal crop diseases is a major advance in controlling this serious problem in world food supply. Developers say aerial photos made from 10,000 feet can detect infected areas missed by trained observers on the ground 10 feet away. Infrared, color, panchromatic films are used. Same methods could be used from planes to distinguish soil and mineral types, plant species, water depths.

Noise research is paying off in at least two areas, say scientists at RCA. New electronic earmuff (actually an earphone) broadcasts "counter-irritant" noise into ear of combat soldiers to make sure they hear vital communications over viclent battle racket. Phone noise is just as loud as battle noise but in opposite phases. Two sounds largely cancel each other, and exterior noises are reduced to a whisper.

LAMINATED ALUMINUM has been used in development of adjustable shimming for machine and other assemblies. Thick-

ness of shims is varied by making them from sheeting developed by Laminated Shim Co.; sheets (0.003 in. thick) consist of layers either bonded together or tacked at margins.

MECHANICAL LIGHT-CHOPPER developed by Westinghouse emits staccato of precise, ultra-fast light pulses for testing how fast electronic devices react to light, other radiations. Should further research in such fields as TV, high-speed photography, fluorescent illumination. Light source is thin light beam (visible or infrared) bouncing off 6-sided rotating mirror surrounded by 5 fixed mirrors then shining out through slit.

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Monthly Chat

Todd-AO Process on the Upbeat

T COMES as no surprise to this corner that reports in responsible trade circles indicate that 20th-Century Fox has of late exhibited keen interest in the Todd-AO process of taking and showing motion pictures-with or without accompanying magnetic sound tracks. This takes quite a bit of doing on the part of 20th for the simple reason that for five years it has not only proclaimed the virtues of Cinema-Scope but, in the early stages of its introduction and subsequent exploitation, it insisted that no product would be available to those theatres which didn't subscribe to the technological requisites of the process.

CinemaScope, as we all know, is a "squeeze" in the shooting process and an "unsqueeze" in the showing process. While this gave us width it necessarily involved a diminution in the vertical aspect.

The current interest of 20th-Century in the Todd-AO process is merely an extension of those dreams with which 20th has been sleeping for the past five years: screen width without compensating height never added one iota of entertainment value in terms of the size of the projected area. No less an authority than Josh Logan, director of, among many other stage and screen presentations, and the guiding spirit in the production of "South Pacific" in both the stage and film versions, said:

Dramatic Content versus Single 'Spectacle'

"I found that with the use of the Todd-AO process I could actually heighten the sense of intimacy that I was able to achieve in the 'live' presentation of the same play on the stage."

Quite understandable is the interest of 20th-Fox in the Todd-AO process: it gives width and height with wholly acceptable coverage from side-to-side and from top-to-bottom of the projected image. This will enable us to present the motion picture without, so to speak, robbing Peter to pay Paul. The curved screen, of course, IP will never buy, it being a bastardization of projection fundamentals.

The contractural arrangements existing between Philips and the Todd-AO organization, whereby the latter is presumed to have the "inside" track for Philips 70-35-mm projectors would seem to offer no serious difficulty were a major producer such as 20th-Fox to elect to use the process. This, despite the oft-repeated announcement that 20th-Fox has its own 55mm process.

At year's end we repeat what we stated in our issue for July last:

"The industry may well ask itself whether dramatic effects and entertainment value really require so many different types and sizes of film and projection equipment. Would it not be possible to capture and retain the interest of an audience through the use of at most two 'standards'-the 'big' screen and the moderate-sized one?"

THE RAPID growth of the A-V department of this publication during the past four months, in which period we have enlisted the interest and active support of more than 700 paid subscribers in key positions in the A-V field, and the cooperation of leading equipment manufacturers, forecasts the expansion of this department. This measure of support encourages us to render a more comprehensive service to those who are vitally interested in the proper selection, operation, and maintenance of that equipment which contributes substantially to the success of any such program.





INTERNATIONAL PROJECTIONIST

extends to all its friends

Season's Greetings

Volume 33

DECEMBER 1958

Number 12

Handling and Projection of 16-mm Sound Motion-Picture Film

It becomes increasingly apparent, as technique improves, that the differences between the presentation of 16- and 35-mm professional theatre film are being narrowed. After all, the proper presentation of either film size grows increasingly dependent upon not only technique but also equipment—that is, get-

ting the most out of that which is provided to do the job. The appended article, we think, is inclusive in setting forth those values which contribute to the overall process, and is highly instructive for both the professional and non-professional worker in this vital field of mass communication.

MANY of the characteristics of 16-mm film seem quite topsyturvy to the 35-mm projectionist. Theatre-release prints are oriented in the projector so that the dull, or emulsion, side of the film faces the lamphouse. In 16-mm projection, however, the shiny base side of the film usually faces the lamphouse, a convention which originated with the introduction of reversal-processed camera films in 1924 for amateur use.

Soundtrack Positioning

To permit inter-cutting with reversal films without disturbance of projector focus, therefore, nearly all 16-mm prints made from 35-mm originals are oriented so that the *shiny* side of the film must face the lamp. Contact prints made from 16-mm negatives, or duplicate reversal prints made from 16-mm positives, color or black-and-

By ROBERT A. MITCHELL

white, must be threaded so that the dull emulsion side faces the lamp—the "off-standard" orientation.

16-mm films are also wound opposite to 35-mm practice. For normally-oriented films (base side toward lamp), the emulsion side of the film is on the outside of the roll. This is because the film comes down from the right-hand side of the feed reel as the projectionist faces the operating side of the machine, not from the left as in theatre practice.

If this were not enough to confuse the 35-mm projectionist, the soundtrack of a correctly-threaded 16-mm film is on the *inside edge*, that is, on the side of the film nearest the projector mechanism case. (With 35-mm, the soundtrack is on the side of the film nearest the operator.)

There are also notable differences in the films. Aside from the small width of 16-mm film (5% inch), it has only one sprocket-hole-per-frame instead of four. Moreover, there is only one row of perforations in 16-mm sound prints, the opposite margin bearing the soundtrack. It is thus impossible to thread 16-mm sound film incorrectly without having the picture upside-down and backwards!

16-mm Results Very Good

Despite the smallness of 16-mm film and its great differences from professional 35-mm film, the results obtainable from it in picture and sound quality are remarkably good. In fact, the pictures projected from cameraexposed 16-mm reversal originals, and

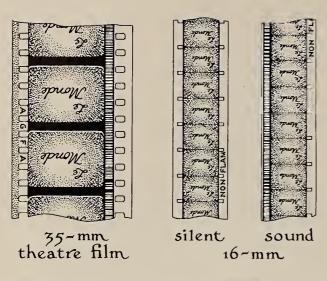


FIGURE I
Comparison of the placement of perforations and sound-tracks on 35-mm and 16-mm motion-picture Ims. These Ims are oriented as they would appear if viewed from the projector lamphouse.

from 16-mm reduction prints made from 35-mm negatives, are comparable in quality with the best theatre prints derived through the usual chain of "intermediate" films—master positives and duplicate negatives. Theatre prints are never made directly from the original camera negatives.

A certain amount of quality is sacrificed in 16-mm prints made from either negatives or reversal camera originals, however. This is due to the small size of the frame and consequent enlargement of emulsion graininess. "Fast" camera films (negative or reversal) are much grainier than "slow" positive stock. Producers of 16-mm prints for TV and audio-visual use prefer accordingly to use 35-mm cameras and reduce the grain along with the picture in optical printers.

Original Print Quality Governs

Excellent results are obtained from 16-mm duplicate negatives on finegrain positive stock when these have been prepared by reduction printing from high-quality 35-mm master positives.

When the 35-to-16 millimeter process is used, all editing, involving a great deal of cutting and splicing, is done in the 35-mm stages. Unfortunately, splices in 16-mm films show up rather prominently on the screen—especially true when the splices are made in 16-mm negatives.

To avoid the white lines printed through from 16-mm negative splices, therefore, 16-to-16-mm producers prefer the use of reversal film in the camera and subsequent contact-printing to produce a negative film on fine-grain stock. Cutting of the reversal camera film gives black, instead of white, splice lines in the final print: these are hardly noticed.

There are other, more refined methods of splicing, of course. Expensive dielectric hot-weld splicers join the film so deftly that no splice is visible. Non-professionals may make butt-joints with Mylar tape, a DU Pont product cut to 16-mm width and perforated by Florman & Babb, Inc., 68 West 45th Street, New York, available in 66-foot rolls.

16-mm Screen Brightness Requisites

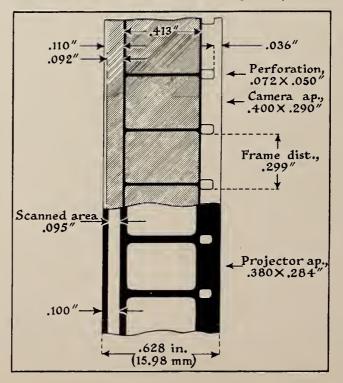
The chief drawback of 16-mm film picture-wise is the difficulty of projecting from its diminutive frames theatre-size screen images of adequate brightness. Special high-intensity reflector arcs drawing from 30 to 50 amperes have been developed to overcome this deficiency (Victor, for example) but it does not appear likely that more powerful carbon-arc lamps can be used in 16-mm work without risk of damaging both the film and the projectors.

Special super-bright flashing lamps of the type developed for theatre projectors by Philips of Holland offer the greatest promise for big-screen 16-mm projection.

Note that 16-mm film is relatively free from buckling and focus-drift even when projected via carbon arcs and 1000-1200-watt bulbs. It is thus feasible to use 3-blade shutters for flickerless 16-mm projection; and because most 16-mm claw intermittents work at the fast 5-to-1 pulldown ratio, several well-known 16-mm projectors are provided with 3-blade shutters to eliminate annoying flicker when run at silent-film speed.

Interesting data anent the maximum permissible picture sizes in regular 16-mm projection on non-perforated matte screens will be presented in the February, 1959 issue of this publication.

The small frame size is a definite advantage in 16-mm photography and projection. Lenses for 16-mm cameras and projectors have high optical speeds even when relatively small in diameter; aberrations can be more perfectly corrected in small lenses, and



* IP

Dimensional specifications of 16-mm sound film, which travels at the rate of 24 frames = 7.2 inches per second. (16-mm silent film, perforated a 1 on g both edges, travels at the rate of 16 frames = 4.8 inches per second.)

FIGURE 2

GET MORE FOR YOUR PROJECTOR DOLLAR



1600 ARC

If the high cost of 16mm arc projectors is forcing you to "make do" with an auditorium-type incandescent-you owe it to yourself to consider the Victor 1600 Arc. It delivers a full 1600 lumens of light on the screen at 30 amps with Mark II Shutter-more than three times that of any incandescent-yet it's still easier on your budget than other 16mm arcs. It incorporates all advanced Victor projector features and a powerful 25-watt amplifier. The 1600 Arc runs for a full hour on one set of carbons, does not require a special projection booth, and is the only arc projector made with 3-case portability.

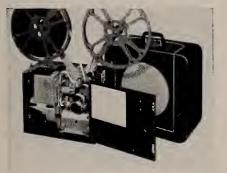
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Selenium Rectifier has top-mounted controls, swingout legs, built-in tilt lock, is blower cooled. Also serves as base for projector.

Speaker case houses 12" bass reflex speaker and is carrying case for 25-watt amplifier-projector unit.

Lamphouse has built-in ammeter with motor rheostat, automatic carbon feed, external arc position marker.

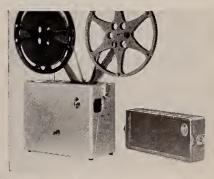
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the relatively short focal lengths of 16-mm camera lenses result in tremendous field depths with knife-sharp images of objects both close to and far away from the camera.

The image-resolving power of almost all photographic-projection processes is limited as much by the performance of the *lenses* as by the film *emulsions*. In 16-mm work, if really high-quality lenses are used, image clarity will be at least as good as in run-of-the-mill 35-mm work; sometimes better.

Sound Reproduction Values

What about 16-mm sound? 35-mm film travels at the rate of 18 inches per second; 16-mm at only 7.2 inches per second. It would therefore appear that 16-mm optical sound would have only 7.2/18, or 40%, of the quality of 35-mm optical sound. That may have been true in the 1930's, but it certainly is not true today.

Remarkable improvements have been made in the narrow-film medium since its widespread adoption by the TV industry. 16-mm soundtracks are made more carefully, and on more advanced types of equipment, than the soundtracks on average 35-mm theatre-release prints. Here again it is the equipment, not the film, that limits quality.

The sound reproduction obtained from 16-mm TV-print soundtracks derived from the best 35-mm optical originals, or from magnetic masters (as in kinescope recording), is often superb and as good as, if not better than, the 35-mm sound heard in the average theatre with its antiquated equipment.

[John A. Maurer states that the quality of 16-mm optical sound is limited as much by the magnetic original record as by the photographic recording process!*]

Response Characteristics

With modern high-precision recording equipment and fine-grain film stock, 16-mm variable-density sound-tracks give flat response to 10,000 cycles with low distortion and signal-to-noise ratios of 45 db; while 16-mm variable-area tracks are capable of flat response to 8000 cycles with even lower distortion and a 55-db signal-to-noise ratio.

These remarkable 16-mm optical-

A-V Reference Chart

The illustrations accompanying this article were purposely designed and reproduced so as to have high visibility. They lend themselves readily to mounting on a stiff-backed surface so as to provide instant reference.

sound capabilities are made possible by improved recorder light-valves, lenses, and ultraviolet light sources. Ultraviolet recording is also used in 35-mm work.

Ordinary visible light penetrates the emulsion of the raw stock and is scattered by the white crystals of silver bromide, blurring the finer striations of high-frequency sound images. Ultraviolet light, on the other hand, fails to penetrate the emulsion appreciably. It does its work on the *surface* of the emulsion, where it produces sharper images.

If all 16-mm optical-sound recording methods were applied to 35-mm film,

theatre-release optical soundtracks could easily attain a response of 20,000 cycles! This is a higher frequency than theatre-projector soundheads with their 0.00125-inch scanning beams can reproduce.

Optical Reproduction Possibilities

Is it not strange that the more easily-adjusted and vastly more efficient cylindrical-lens sound optical system should have been developed mainly for 16-mm, instead of 35-mm, projectors? Modern 16-mm cylindrical-lens sound optics produce a bright, uniformly-illuminated scanning beam 0.095 inch in length and only 0.00050 inch in width. This is adequate for reproduction to 8000—9000 cycles with only slight fall-off in output. (Cut-off frequency is at 14,500 cycles.)

The cylindrical-lens positioning is not so critical as optical-tube focus in theatre soundheads, but sagging exciter filaments must be guarded against as a cause of "mushy," "boomy," distorted sound. There is no sound slit in this system, for the cylindrical

(Continued on page 20)

TABLE A											TABL	E B		
16-mm FILM FEET to RUNNING TIME							RUNNING TIME to 16-mm FILM FEET					er		
LENGTH	REEL DIAM.	SOUND (SILENT (16 f/s) hr. min. sec.		RUNNING TIME		SOUND		SILENT				
(Feet)	DIAM.	III. MI	n. sec.	111.	штп.	sec.					Feet	Reel size	Feet	Reel
1			1.67			2,50	F							
5			8.33			12.50	╢╻	sec			0.6		0.4	
10			17			25	1	min			36		24	
20			34			51	2				72		48	
25			42		1	3	5				180		120	
50		1	24		2	5	10				360	7"	240	
75		2	5		3	8	15				540	9"	360	7"
100	3½"	2	47		4	10	20	. 11			720	1011	480	
150		4	10		6	15	25				900		600	9"
200	5"	5	34		8	20	30	11			1080		720	10½"
250		6	57		10	25	35				1260	12"	840	i
300		8	20		12	30	40	11			1440		960	
400	7"	11	7		16	40	45	11			1620	14"	1080	
500		13	54		20	50	50	11			1800		1200	12"
600	9"	16	40		25	0	55	п			1980	16"	1320	
800	102"	22	13		33	20	1	hr.			2160		1440	
1000		27	47		41	40	1	hr.	5 n	in.	2340		1560	- 1
1200	12"	33	20		50	0	1	11	10	н	2520		1680	14"
1400		38	54		58	20	1	11	15	п	2700		1800	
1600	14"	1474	27	1	6	40	1	11	20	11	2880		1920	
1800		50	0	1	15	0	1	tt	25	11	3060		2040	16"
2000	16"	55	34	1	23	20	1	11	30	11	3240		2160	
2200		1 1	8	1	31	40								

Journal of the SMPTE, February, 1957, p. 49, et sea.

WHAT CLICKS AT THE BOX OFFICE?



A scene from Jerry Wald's IN LOVE AND WAR for 20th Century Fox.



ATIONAL PROJECTOR CARBONS

bring out photo-realism with the brightest light on earth!



"NATIONAL" CARBON ARC brightest man-made light!

Today's money-makers are big, bright, *realistic* pictures. To show them, you need brighter-than-ever lighting.

"National" arcs bring out all the realism Hollywood puts on film, with the brightest light on earth. And, because these arcs match the sun's color balance, deep colors come alive. Wide screens show vivid detail. Outdoors, sharp images travel hundreds of feet. Indoors, "National" carbon picture-brightness allows comfortable house lighting.

These slower burning "National" Projector Carbons help cut operating costs: "Suprex" 7mm, 8mm and 9mm carbons — 10mm, 11mm and 13.6mm High Intensity Carbons.

"National", "Suprex" and "Union Carbide" are trade-marks of Union Carbide Corporation

NATIONAL CARBON COMPANY • Division of Union Carbide Corporation • 30 East 42nd Street, New York 17, N. Y.

SALES OFFICES: Atlanta, Chicago, Dallas, Kansas City, Los Angeles, New York, Pittsburgh, San Francisco • IN CANADA: Union Carbide Canada Limited, Toronto

UNION

There is a definite relationship between the radiant output of the carbon arc and the projected screen image. The "coloration" characteristics of the carbon arc, wherein a variation of 1/10 inch will be reflected by the projected image, is a primary function of the projection process. The relationship between color temperature and the quality of the projected image is discussed by an acknowledged authority in the art.

ALL of us are familiar with the fact that material substances become luminous when heated to sufficiently high temperatures. The glowing coals in a furnace, the heater element of an electric toaster, and the filament of an incandescent lamp are everyday examples.

As such, a body becomes hotter and hotter, its color progresses from a dull-red at low temperatures to a brilliant-white at higher temperatures. Common observation of this fact results in a natural association of the temperature of the heated body with the color of the light given off thereby.

We know that the dull-red glow of the electric toaster element symbolizes a cooler temperature than the yellow-white color of the incandescent lamp. It was a natural step to attempt to associate temperatures and colors of heated bodies, quantitatively, and to describe the color of the light by the temperature necessary to produce it.

Variations in Color

Unfortunately. all substances do not radiate the *same color* or intensity of light at the *same temperature*. Just as common objects show a varied color appearance at room temperature, they likewise will show characteristic differences at high temperatures. Bodies which appear red, green, blue or some other color at ordinary temperatures, will also show distinctive differences in the various colors when they are *heated*.

However, scientists have learned there is one type of body which behaves in a precise unvarying manner and which has an *exact* correlation between color and temperature. This is the so-called "black body."

By definition, a "black body" has the property of absorbing *all* the ultra-violet, visible and infra-red radiation which falls upon it. Therefore, when such a body is illuminated at room temperature by any external light source, it will appear perfectly *black*.

The simplicity of its behavior to incident light suggests an equally precise behavior as a light source when a black body is heated to incandescence. Such is indeed the case; and scientists have devised mathematical equations completely specifying the radiant energy

COLOR

TEMPERATURE:

What Is It?

By W. W. LOZIER

National Carbon Company*

emitted by a "black body" at any temperature.

Most actual substances differ from the "black body" because they reflect some portion of the radiation which falls on them, and, hence, do not absorb it all. However, the behavior of a "black body" can be duplicated by a small opening in a uniformly-heated enclosure of any material.

If the opening be made small enough, the cavity will absorb all incident radiation through multiple reflections inside the body and the radiation issuing from it will be typical of a "black body". For example, the radiation from a small hole in an enclosure made of carbon, metal, ceramic or any other material, will approximate "black body" radiation at any temperature which the material will withstand.

Definition of Terms

The temperature of a "black body" is sufficient to define all aspects of its radiation, including the color. In this way, a series of definite colors can be specified, ranging all the way from a very deep red to a very brilliant white. each associated with a "black body" at a particular temperature.

Because of the precise nature of this color scale, it is convenient to specify the color of other types of light sources in terms of the "black body" color temperature scale. The term "color temperature" used for this purpose means that the light source so specified has a color quality most nearly matched by the color of a "black body" at the temperature stated

Color temperature may be ascribed only to those light sources having a color close to that of a "black body". In passing along the color temperature range from a deep red to a brilliant white, a "black body" assumes only a very small fraction of all the colors possible in nature. As a consequence, the colors of many light sources differ so greatly from that of a "black body" at any temperature that the term "color temperature" is of no use whatever in describing the color of such a source.

Familiar examples are the sodium lamp and the mercury-vapor lamp, the characteristic hues of which cannot be duplicated by "black body" temperature radiation. Carbon-arc and incandescent tungsten colors are similar enough to those from "black" bodies to permit them to be described by their color temperature.

Because other methods of color specification are usually much more complex, the "black body" color temperature scale has found rather wide use, despite its limitations.

Also, color temperature in many cases is ascribed to a beam of light which may be considerably separated from its source in distance and may even be altered in color. For example, it is customary to speak of the color temperature of sunlight, even though its color has been *modified* in coming through the earth's atmosphere.

There are two generally accepted methods of determination of color temperature of a light source. One method involves matching the intensity and color

TABLE I. Color Temperatures of Various Light Sources

	COLOR TEMPERATURE			
SOURCE	Absolute	Fahrenheit		
Hot Body at Lowest Temperature Producing Incandescence	800	980		
100-Watt Tungsten Lamp	2865	4700		
Standard 1000-Watt Tungsten Projection Lamp	3250	5390		
Low Intensity Carbon Arc	3550	5930		
"Pearlex" High Intensity Carbon Arc	4600	7820		
Average Sunlight	5090	8700		
Other High Intensity Carbon Arcs	5250-6400	8990-11,060		
Average Daylight	6500	11,240		

^{*} Division of Union Carbide Corporation.

of the light source under study with that of a comparison standard. This comparison standard frequently is an incandescent lamp, the color temperature of which is regulated by varying the electric current passing through the filament. Obviously, direct use of this latter method is limited to colors which can be produced by temperatures below the melting point of the incandescent filament.

The second method depends upon the spectroscopic measurement of the amount of energy of each color present in the light source, i.e., a determination of the spectral energy distribution curve. This is followed by a calculation which correlates these data with the average behavior of the human eye and results in the color temperature value for the light source. All of the color temperature values for carbon-arcs quoted in this article have been obtained by this latter method.

Various Light Sources

Table I shows the color temperature of familiar artificial and natural light sources. Color temperatures are designated on both the familiar Fahrenheit basis and also on the *absolute* or Kelvin (°K) scale more widely used in scientific work.

Bodies begin to be luminous at about 800°K (980°F.).

The common 100-watt incandescent tungsten lamp for general lighting is stated to have a color temperature of 2865°K (4700°F.). The standard 1000-watt tungsten projection lamp has a quoted color temperature of approximately 3250°K (5390°F.).

The low-intensity carbon arc with a color temperature of about 3550°K (5930°F.), is significantly whiter than the tungsten sources, as is well recognized in picture projection applications.

Next in order is the "Pearlex" carbon arc used for projection of 16-mm film which has a color temperature of 4600°K (7820°F.). Sunlight, daylight and high intensity carbon arcs falling in the 5000-6500°K (8540-11,240°F.) range represent what are generally considered as "white

light" sources. Light sources with color temperatures much higher than this appear distinctly blue. The blue of the sky may have a color temperature of the order of 25,000°K (44.540°F.).

Color Temperatures of Screen Light

A number of typical carbon-arc motion picture projection systems have been evaluated in terms of the color temperature of the light on the projection screen. These are represented in Table II.

These measurements include the effect of the optical system in altering the color of the bare arc. The low-intensity carbon-arc gives a screen-color temperature of 3870°K (6500°F.). The "Pearlex" carbon-arc provides screen light with a color temperature of 4450°K (7550°F.), suitable for projection of 16-mm color film. All of the other highintensity carbon-arc systems shown have color temperatures between 5000°-5800°K (8540°-9980°F.) within the sunlight-daylight range. These values demonstrate the well-known fact that these high-intensity carbon-arcs give a color closely resembling daylight, much whiter than the low-intensity arc.

In many cases, the true operating temperatures and the color temperatures of substances are not far different. For example, there is research evidence available indicating that the luminescent gases near the floor of the positive crater of high-intensity carbons are at a true temperature in the same range as their color temperature of 5000-6500°K (8540-11,240°F.).

The energy to maintain this high temperature is supplied by the electrical power EXPENDED in the arc.

NOTE: Table II appended is presented for comparative purposes only as an aid to a clearer understanding of color temperature. Not included therein is any reference to or data upon the latest types of high-intensity carbon are projection systems which of course merit substantially higher ratings overall.—ED

Under the influence of the electrical voltage applied to the carbon electrodes, electrons are accelerated to very high velocities which cause them to strike, like bullets, the rare earth atoms volatilized from the core. The rare-earth atoms absorb energy from the bomharding electrons, and later radiate it as light of various colors.

It is a characteristic of the rare-earth materials used in the high-intensity carbon that they can radiate light of many colors throughout the visible spectrum, resulting in radiation very similar to that from a "black body". Therein lies part of the explanation for the whiteness as well as the brightness of the high-intensity carbon-arc.

Historical Perspective

One of Eastman's most valuable assets—the trademark "Kodak"—is now 70 years old. The work "Kodak" was invented by George Eastman as the name for his revolutionary hox-camera introduced in 1888. Within a few short years it became familiar around the world.

"The letter 'K' has been a favorite with me," Mr. Eastman related. "It seemed a strong, incisive letter. Therefore, the word I wanted had to start with 'K.' Then it became a question of trying out a great number of combinations of letters that made words starting and ending with 'K.' The word Kodak was the result."

New SMPTE Tape Committee

The Video Tape Recording Committee has been established by the SMPTE to propose standards and good engineering practices for construction, operation and measurement of VTR equipment.

The committee, under the leadership of Howard A. Chinn, CBS-TV, plans to consider standardization in the following areas: tape (dimensions and identification), tape reels (huh and flange), tape tracks (locations, video, audio, control-, and cue-tracks) recorded signal electrical characteristics (video, audio, control and cue), tape leaders, methods of measurement, terminology and tape splicing.

TABLE II. Color Temperatures of Light on Projection Screen with Various Carbon Arc Projection Systems

			COLOR	TEMPERATURE
Lamp	Carbon Trim	Amperes	Absolute	Fahrenheit
Low Intensity Lamp	12-mm-8-mm Low Intensity 6-mm-5.5-mm "Pearlex"	30	3870	6500
Lamp for "Pearlex" Trim		30	4450	7550
"One Kilowatt" d-c Lamp "One Kilowatt" a-c Lamp	7-mm "Suprex" Positive—	40	5300	9080
	6-mm "Orotip" C Negative	52	5260	9010
	7-mm–7-mm "Suprex" Positives	65	5420	9300
Simplified H.I. Lamp	7-mm "Suprex" Positive-	42	5020	8580
	6-mm "Orotip" C Negative	50	5060	8650
Simplified H.I. Lamp	8-mm "Suprex" Positive—	65	5340	9160
	7-mm "Orotip" C Negative	70	5270	9030

In the SPOTLIGHT

THIS page has always been a secluded corner wherein traditionally is discussed craft welfare in terms of people—those who, whether individually or collectively, represent craft entity. This tradition will be preserved. At year's end it seems fitting that craft well-being be assayed by a foreshortened summary of those events of the past 12 months which bear directly upon its fortunes.

Witness: The closing of more theatres which, granted a whit of foresight and concerted action by a united (alas, disunited) industry would have at the very least forestalled such an eventuality. This premise is based upon a number of happenstances:

1. A drastically-reduced number of releases which, in turn, was the result of

- 2. Restricted production because of the astronomical money demands of "stars," directors, writers, and practically everybody else concerned with the *production* of a motion picture.
- 3. The acceptance, without thought, of the idea that only a "big" (the trade term being "blockbuster") could return in dollar value the economically-unrealizable gross demanded by the very terms set before a camera turned.
- 4. Extended runs in downtown areas on a hard-ticket basis indicates that "downtown" is no longer a magic word in show business.
- 5. Saturation booking of a given feature film in one area which, while netting the distributor a fast dollar turnover with a limited number of prints, then goes on to another saturated area, often without cursory mechanical inspection and which
- 6. Leaves the eagerly-sought-for paying public no selection.
- 7. The exhibition in a given restricted area of, sometimes, FOUR pictures featuring the SAME lead players, thus throttling the interest of the patron.
- 8. Increasingly difficult technique in the handling and showing of such stuff as multiple reels and consequent technological alertness in the projection room, while the president of the Theatre Owners of America bleats in a public forum that "the Unions" are "ruining" the exhibition end of the business. He then demands a reduction in manpower. This is inconsistency carried to the Nth degree.

Being industry-wise, we are chary of anything even suggesting optimism for the future. In the case of TV, the organized craft was caught napping in the apple orchard on a languid summer's day while its proper functions were being usurped by a group which had no right in the premises.

There is, however, a new development which, if ridden at full tide, may well carry a large majority of the craft into a snug harbor. This is T-A-P-E.

As an indication that at least some local units of the craft read the horizon aright, we are happy to report the graduation recently from RCA Institutes of 28 members of New York City Local 306 after an intensive course covering all aspects of this medium. Some 3000 miles removed, our Los Angeles craftsmen duplicated this training effort. These shafts of light merely pierce an otherwise gloomy area of inactivity relative to this onrushing technique which may well supplant current media and practice.

We hope that one year from today we may be able to report that T-A-P-E is wrapped around the organized craft—and *vice-versa*.

• IA President Richard F. Walsh recently attended two 50th anniversary parties of IA units—Portland, Ore., and Lincoln, Nebr. Oregon's Governor Robert Holmes and his lady, and Congresswoman Edith Green were at the Portland affair and (don't tell anybody but we are happy to report that) President Walsh indulged in his favorite pastime of "shaking down" the group for a sizeable check for his favorite charity, our

own Will Rogers Memorial Hospital at Saranac Lake, N. Y., of which he is a director.

- The annual installation of officers of the 25-30 Club of New York will occur at a banquet scheduled for January 8 next at the Empire Hotel, Broadway and 63rd Street, New York City. Reservations at \$5.50 per person are available from Secretary Morris Klapholz, 125 West Tremont Ave., Bronx 53, N. Y. No tickets will be sold at the door.
- At a recent regional exhibitor gathering a distribution chief outlined the "wonderful" upcoming product from his company. Immediately following, the exhibitor chairman divested himself of the following cogent remarks:

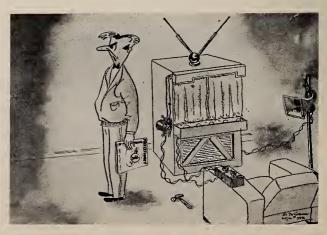
"Present distribution policies are cockeyed, particularly that of roadshowing 'blockbusters'.

"Please tell us how and when these wonderful pictures you listed this afternoon will ever reach us, the subsequent run theatre? Only after they have played so long in situations ahead of us that their efficacy has gone? First the road companies roadshow the pictures, then they play first-run after roadshows (at pop prices), then they play 'selective spots,' then, if we're lucky, we get them when they are pretty tired."

Distributor's answer: none.

- For the 46th consecutive year directors of Eastman Kodak Co. have voted a wage dividend estimated at \$40,200,000 to be shared by more than 49,000 Kodak men and women in the United States. Eligible employees will receive \$32.625 for each \$1,000 they earned at Kodak during the five years 1954-58. About \$37,900,000 was paid last March at a rate of \$32.00 for each \$1,000 earned during the years 1953-1957.
- Joe Ellwood, due to illness, resigned as financial secretary of Local 219, Minneapolis, Minn., just short of his 22nd anniversary in that office. Previously he had served as business representative and as an executive board member.

The Cute (?) Kids' Idea of Making The Old Man (Joe Projectionist) Feel Right at Home.





AUDIO - VISUAL

EDUCATIONAL · INDUSTRIAL · COMMERCIAL

Practical A-V Operational Aids

By JOSEPH P. HOLT, Contributing Editor

W E URGE STRONGLY consideration of the new variable focus lens now available for 16-mm projectors. The speed of the assembly is constant at F:1.6 through focal lengths from 1¾ through 2¼ inches. This one lens makes it possible to fit the projected image precisely on one screen, even though the projector-to-screen distance may vary as much as six feet, under normal working distances.

Magnetic striping is also a great boon to the A-V instructor. The cost has recently been brought within the reach of almost any budget, and new flexibility more than justifies the expense. One manufacturer offers a turret unit for both optical and magnetic tracks which allows use of either type recording.

This feature allows film commentary to be brought up-to-date at any time without concern about synchronization. Striping can be placed upon single- or double-perforated film. Old silent instructional films can now be coupled with up-to-date comment at a reasonable cost.

Why let your services suffer for lack of this great advance?

In oilling older types of projectors, try dipping an ordinary pipe cleaner an inch or so into a bottle of projector oil. The amount necessary for the point to be lubricated can then be readily controlled by slight pressure of the pipe cleaner against the oil opening. Such simple items also make excellent emergency substitutes for an oil-wick if the end is bent back upon itself.

IF THE PROJECTOR is used over a dispersed geographical area, it is mandatory to have a "first-aid" kit for the use of the operator. It is not enough to throw a spare lamp in the projector case. Emergency spares should be grouped carefully in a sealed carton or envelope. Once the seal has been broken, the supervisor of A-V equipment knows that some shortage exists and can inventory the container for exact replacement of the missing part.

The question is often asked: "Just what should the emergency kit contain?" In reply, let us begin with a projection lamp of the proper rating wrapped in protective cellulose mate-

rial; then let us go on to include some type of heat-protective substance to facilitate the removal of the overheated lamp. A piece of toweling should be enough, but an excellent idea is to include one of the padded gloves such as are sold for kitchen or patio use.

Suggestion: Use a short instructional sheet to make certain that the operator knows the proper steps for quick replacement of the burn-out.

Fuses of the exact rating as specified by the manufacturer should be placed in small envelopes clearly marked as to use. Sometimes a spare exciter lamp will be useful, but once again be sure that a mimeo sheet telling briefly how to install it is in the same envelope where it cannot be missed.

If the larger-wattage projectors are used in buildings where the voltage supply is subject to fluctuation, it will prolong projection lamp life consider-

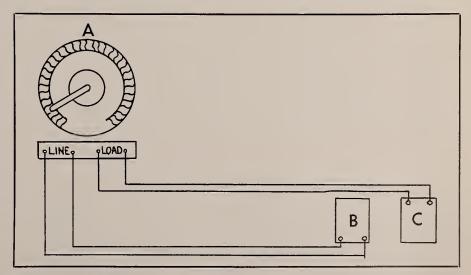
ably to provide a manually-operated autotransformer equipped with a meter to read line voltage. Such devices are available commercially, or can be easily constructed by any competent electrician or radio service house.

In fact, any projector will have increased lamp life if the lamp circuit only is voltage-controlled. The accompanying diagram indicates the simple wiring changes which may be made in order to pre-warm projection lamp filaments. The principal advantage here is that we avoid the thermal shock which attends the application of the full line voltage to the lamp when it is cold

Try this tack with your projectors and you will agree that the saving and increased efficiency are well worth the time and money they require.

CAUTION: it is not recommended that the user merely lower the voltage on the entire supply to the projector because the sound amplifier tubes can very easily be damaged by prolonged operation at extremely low filament voltages. Admittedly, there exists some controversy on this point—but it is better to avoid using any except the voltage for which the amplifier is designed.

Also, the projector should be turned manually until the shutter shields the film in the aperture from any light from the lamp. Even though the lamp be warmed only at a dull red glow,



Indicating the general plan for pre-warming projection lamp filament and applying full voltage gradually. A represents a calibrated autotransformer of one kilowatt capacity; B depicts the terminals of the projector motor switch or other point which is energized when the projector cord is plugged in; C represents the terminals on the lamp side of the lamp switch, from which the leads have been lifted to prevent instantaneous application of line voltage to the lamp.

there is enough transmission of heat to make curling and buckling of the leader possible. It is not inconceivable that a frame of film could be burned, and this might result in smoking-up the rear element of the projection lens.

But don't let these minor considerations stop you from gaining the advantages obtained in longer lamp life, particularly since you gain extended optical efficiency.

A READER inquires about the cleaning of film which has picked up oil and dirt. Usually, 16-mm film does not get much oil on it, except in cases where we have seen projector oil to lubricate freshly-processed film which was sticking in the projector aperture. (Incidentally, if there be any question about new print handling, we will be glad to advise.)

The point here is that if for some reason the print seems to require cleaning, most conditions can be corrected merely by passing the film through a soft, clean cloth held in the hand while the film is rewound slowly. Change folds of the cloth often to avoid scratching from foreign substances. If the film be really dirty, it is best to send it to a well-equipped supply house for professional cleaning.

Don't use carbon tetrachloride for cleaning film. The problems of ventilating the room where "carbon tet" is



Good results require careful preparation.

used are too complex to allow its use. It can also bleach film and distort colors.

We hope to continue to encourage your written responses. If your problem is not covered in the body of this article, let us know what it is. Anything which seems to be of general interest will be covered in general discussion, and other matters will receive private counseling by mail.

RCA's Hi-Fi Conversion Kits

Five kits making possible inexpensive and effective conversion of present RCA hi-fi instruments to play stereophonic records are now available. The kits are:

Model CK-2: a complete stereophonic record-changer replacement including the new RCA stereophonic cartridge with diamond/sapphire pick-up, enabling the playing of the new stereophonic disk monaurally on existing hi-fi sets. Price \$49.95.

The Conversion Process

Model SA-2: a single speaker and a second amplifier unit in a table cabinet. This unit, when combined with model CK-2, completes the conversion to stereophonic sound with separate amplifiers and speakers for each of the two channels. Price \$54.95.

Model SH-3: a second amplifier and a three-speaker sound system in a console cabinet—a deluxe version of model SA-2. Price \$79.95.

Model SK-2: a modification parts kit including the stereophonic cartridge with a diamond/sapphire pick-up. Price: \$19.95.

Model AK-1 is an AC-DC dualchannel amplifier. Price \$29.95.

While complete flexibility is assured by RCA, caution is advised in the absence of conclusive tests.

Kodak 4-Lamp Movie Light

A COMPACT new 4-lamp movie light bar designed to increase the convenience of indoor home movie-making has

Acceptable Solvents Meeting the General Requirements for Effective Film Cleaning

	Effect on Film Support								Residue	Electro-			
	Prop	etate- ionate 60 Min.	But	tate- yrate 60 Min.	High-Ace Ace 15 Min.	tate		Tenite Cores 60 Min.	Personne sonnel Hazard	l on Evapo-	static Discharge Ability	Odor	Cost/ Gal.
1. n-Butyl chloride	None	None	None	Chord	None	None	V. Slight Swelling	Mod. Swell.	None	None	Excellent	Ethereal	2.80
2. Carbon tetrachloride	None	None	None	None	None	None	None	None	High	None	V. Poor	Chloroform	1.47
3. Cyclohexane	None	None	None	None	None	None	None	None	Low	None	V. Poor	Aromatic	0.72
4. Cyclopentane	None	None	None	None	None	None	None	None	Low	None	Poor	Aromatic	8.32
5. Freon-113	None	None	None	None	None	None	None	None	Low	None	V. Poor	Chloroform	8.33
6. Heptane	None	None	None	None	None	None	None	None	Low	None	V. Poor	Aromatic	0.19
7. Hexane	None	None	None	None	None	None	None	None	Low	None	V. Poor	Aromatic	0.19
8. Isopropyl alcohol	None	None	None	Sl. Curl	None	None	None	None	Low	None	Excellent	Pleasant	0.50
9. Methyl chloroform*	None	None	None	None	None	None	Slight	Swell.	Low	None	Excellent	Chlcroform	1.44
10. Methylcyclohexane	None	None	None	None	None	None	None	None	Low	None	V. Poor	Aromatic	2.57
11. Naphtha, Petroleum†	None	None	None	None	None	None	None	None	Low	None	V. Poor	Naphtha	0.18
12. Toluene	None	None	None	Curl	None	None	None	Swell.	Mod.	None	V. Poor	Aromatic	0.35
13. 2,2,4-Trimethylpentane	None	None	None	None	None	None	None	None	Low	None	V. Poor	Aromatic	3.46
14. Water‡	None	None	None	None	None	None	Nonc	None	None	Salts	Excellent		

Here is an authoritative presentation of data relative to effective solvents for film cleaning as evaluated on the basis of those considerations which are of primary import—not the least of which is the factor of cost. Strangely enough, it appears that a simple solution, readily available, known as water, is a most effective cleaning agent; the while the highly-publicized chemicals bearing a high price tag exhibit with use serious operational deficiencies. These data require only a

few moments' study to convey to even he who reads as he runs the comparative worth of any given cleaning agent. IP offers these data without comment because they are the result of intensive and exhaustive inquiry by a group of acknowledged experts in the art, namely. Messrs. F. J. Kolb. Jr., D. W. Fassett, and E. M. Weigel, of the Research Laboratories of Eastman Kodak Co., who presented this paper before a recent meeting of the Society of M-P and TV Engineers.

* Data obtained from tests of Dow Chlorothene. † Data obtained from tests of Esso Solvent No. 1. ‡ Repeated wetting and drying of some films may produce density changes.

been announced by Eastman Kodak. Only 14½ inches long, the Kodak 4-lamp Movie Light (Model 1) employs the new, small size, 300-watt, reflector flood lamps. To reduce undesirable shadows, the lighting unit mounts above the eamera.

Two switches enable the use of either the two outside lamps, the two inside lamps, or all four lamps depending upon his needs. Exposure information based on the use of Kodachrome Type A Film is conveniently located on top of the light bar. Two hooks on the back of the unit are designed for easy storage of the heavy-duty, 8-foot electrical cord. List price: \$10.75.

Loudspeaker Efficiency

By JOHN K. HILLIARD

Director of Advanced Engineering Altec-Lansing Corp.

LOUDSPEAKER EFFICIENCY is an important design factor that is often overlooked or misunderstood by those who enjoy high fidelity. It is only logical to assume that any device should be engineered to be as efficient as possible whether it is an auto engine, an amplifier or a loudspeaker.

Speakers which have very low efficiency were not designed with that feature in mind. Rather this low efficiency is a by-product of one of the simpler and less expensive engineering methods used to achieve bass response and low distortion.

High Price For Bass

Such designs, in an effort to achieve greater bass and low distortion, utilize a heavy cone which has inherently low resonance. This heavier mass provides greater bass but carries with it the high price of poor transient response, loss of mid and highrange efficiency and smoothness, and heavier amplifier requirements.

Many speakers following this design approach require as much as 16 times the amplifier power to obtain the same listening levels as more efficient units. Ten watts versus 160 watts seems like an extreme design compromise. Few, if any, of the stereo amplifiers will provide sufficient power for full dynamic range at normal listening levels with such low efficiency speakers.

Compromise Not Necessary

With a more carefully integrated design approach, and the acoustical laboratories necessary to truly evaluate results, it is not necessary to make this compromise to achieve bass. A properly-designed magnetic



Your SIMPLEX Projector Mechanism represents a priceless investment. You bought it after long, careful study because you recognized it as the finest projector on the market.

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Still another helpful hint.

structure will provide a strong flux throughout a long air-gap. Cones, with their compliance and voice-coil designed for long linear excursion throughout the audio range, will operate in this high flux with great efficiency. Such a design has low distortion and good bass without any compromise in efficiency or transient response.

All Altec speakers are the result of such integrated design principles. Their bass reproduction is in proper balance with the rest of the audio spectrum. Their distortion and transient response have received careful attention. Their efficiency is as high as present engineering art permits.

Remember: a good loudspeaker design need not sacrifice a part of the whole performance in order to provide a single outstanding feature. Listen *critically* at *all* levels of loud-

ness. Detailed brochure available free from Altec-Lansing Corp., 1515 So. Manchester Ave., Anaheim, California.

Fine Westinghouse A-V Aid

ONE OF THE finest A-V aids to come to the attention of IP is the unique lamp replacement guide issued recently by the Lamp Division of Westinghouse Electric Corp. The 20-page guide serves as a quick reference for replacing lamps in motion picture and slide projectors, polarizing stereo projectors, microfilm readers, and lantern slide and opaque projectors. It also contains a guide for replacing sound-reproducer lamps.

To use the guide, one merely selects the wattage of the projection lamp desired, using a handy thumb-index. Then, looking under the manufacturer's name and model designation, he can select the correct lamp replacement. The guide is printed on extra-heavy stock to permit its frequent use without becoming damaged.

According to H. J. Hanbury, marketing manager, the projection lamp guide was prepared to give quick and accurate information on



Sound units require gentle handling.

the correct lamp for use in any standard-make projection machine. It is so arranged that either the brand name or the name of the projector manufacturer can be used as a reference.

The information in the new guide was supplied by the manufacturers, and the lamps listed for each machine are those recommended by the projector manufacturer. Copies of the new booklet may be obtained from Westinghouse or from this publication.

Season's Greetings



PROJECTOR CARBONS

NATIONAL CARBON COMPANY

Division of Union Carbide Corporation

NEW YORK



LETTERS TO THE EDITOR

One-Blade, Conical Shutter

To the Editor of IP:

Monthly I read with great interest the articles by Robert A. Mitchell in IP. Yet, in your September. 1958 issue (Number 9, page 9) I read: "The use of a single-blade conical shutter would be a great advantage."

Possibly, you have never seen the Philips DP 70 projector which has such a shutter? This mechanism is used in all Todd-AO showings, and this extends even to the United States.

Unfortunately, there are no pictures of this shutter; but surely you must have seen the projector and its shutter in any Todd-AO-equipped theatre. The same type of shutter is used in the newest FP-20 projector which was shown at the Photokina exhibition in Cologne, Germany. through this Summer and which you described in detail in your November, 1958 issue (p. 8).

Dr. V. Jensen

ALLGEMEINE DEUTSCHE PHILIPS INDUSTRIE GMBH Hamburg, Germany

MR. MITCHELL REPLIES: I however, am not quite so ignorant of the Philips one-blade conical shutter as Dr. Jensen appears to think. Not only have I studied assiduously the technical data anent the Todd-AO projectors, but I have examined them closely at first-hand by working with them.

Some doubt about the efficacy of these mechanisms was stirred up in my mind when I suggested (the first one, I think) that Simplex incorporate this type of shutter in the Simplex X-L projector. The consensus among the engineering personnel was that a one-blade conical shutter could not be "dynamically balanced"—that is, made to run free from vibration.

I knew then, and my viewpoint has since been reinforced by experience and by mathematical calculation, that this viewpoint was incorrect. Of course, such shutter type is not only feasible but, in fact, eminently desirable.

Focus Again; Curved Gate

To the Editor of IP:

If the W-308-C focusing shaft spring washers were broken, could that occasion

MITCHELL'S MANUAL OF PRACTICAL PROJECTION

trouble in focusing our picture on the screen? Also, would you please let us have the name of the manufacturer of the curved gate for Simplex projectors.

M. STANGL

Dubuque, Iowa

Since the purpose of the three W-308-C focusing-shaft spring washers of the Super Simplex is to prevent backlash between the threads of the

S-1166-C lens-carrier adjusting screw and the threads of the threaded hole in S-1169-C lens-carrier support, damaged W-308-C washers may cause looseness of the lens-holder sufficiently great to allow the lens to "creep" out of focus.

This defect is presumably most troublesome with the short-focus lenses for regular wide-screen projection. Damaged spring washers should be replaced immediately to eliminate this shortcoming.

As for the curved gate, we refer you to Bill Ingram, Madison Theatre Building, Rochester, N. Y.—one of our Local Union 253 boys.

Season's Greetings

from

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to the thousands of projectionist craftsmen throughout the world who have utilized our equipment to present the finest motion picture and sound reproduction in the entertainment field.

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We welcome this opportunity to extend the Season's greetings to our many friends in the projection craft who, working together with us thru the years, have enabled us to progress in the drive-in theatre industry.

F. W. Keilhack

L. E. Higginbotham

DRIVE-IN THEATRE MANUFACTURING COMPANY

505 West Ninth Street

Kansas City 5, Missouri

TAPE: On the March for R & R

Let's face it: the use of tape for both recording and reproduction, extending even into the theatre domain is here. IP extends its thanks to Arthur Gavin, Editor of American Cinematographer (official organ of the organized cameramen in Hollywood) for specifically directing our attention to the appended excerpts from his August issue.

VIDEO tape recording (VTR) is gaining momentum. As with other changes that periodically take place in the motion picture industry, VTR is being weighed, evaluated, and discussed in various quarters according to the effects and/or results-good or badit holds for those most concerned-the wage earners.

An "Immediate Problem"

VTR, the system of electronic recording of pictures and sound on magnetic tape, has been a long time (too long?) in development. Within one year it has been put in actual practical use in TV production.

Questions posed by VTR are: Will it replace photography in entertainment

motion pictures? If so, how soon? Most immediate threat is in the field of TV film production, where VTR could replace film photography of half-hour video programs. Some independent TV stations (i.e., those not allied with national networks, such as NBC and CBS) are taping several of their "live" program originations with the view of syndicating same among other tapeequipped independents.

Any effect of VTR upon theatrical film production still appears a long way

But refinements and improvements could change this at any time. Biggest obstacle here has been difficulty in editing video tape; but this is being overcome. Even special effects in VTR is now an easy accomplishment, engineers

Film laboratories would be the first to feel any general swing to VTR, especially if it were to take over TV film program production. When and if this happens, cinematographers, too. will be hard hit. More than 50% of Hollywood's cameramen are engaged in TV film photography.

The general recent trend of VTR is reflected in the following excerpts from Hollywood's two leading industry trade papers:

"There are no problems in the editing or splicing of tape anymore. You watch it on the monitor and make notes, then edit. In time, you'll be able to insert a beep in the tape where you want changes. . . . RCA filmed a 60-min. color commercial which cost \$17,000. Same show on tape would have cost \$5,000" (Leo Guild Daily Variety, June 13th.)

"Networks may become a major factor in TV commercial production as a natural consequence of their work in video tape. . . . CBS-TV has already set up a commercials-on-tape service at CBS Television City (Los Angeles) and NBC intends to do the same. . . . CBS has taped commercials for Pet Milk, Socony-Mobil Oil, Ford and Remington."—(Daily Variety, June 25th.)

As a "Matter of Course"

"CBS-TV producer Dominick Dunne . . . foresees the day when live drama producers will utilize natural exteriors, via pre-taping (by VTR), as extensively as film producers do, as a matter of course." (Hollywood Re-

"First three segments of a videotaped series . . . get under way at KTTV Studios today, and will be offered to VTR-equipped stations on a national syndication basis." (Holly-

"'We're not now, nor forever after

porter, July 2nd.)

wood Reporter, July 18.)

Best Holiday Wishes

to projectionists throughout the world whose effort and skill have helped so much in the task of modernizing projection methods.

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OBITUARIES

Powers, Sr., James R., 72, charter member of Detroit Local 199, died recently after an extended illness. He is survived by his wife, a daughter and three sons.

'Honorary pall bearers were brother charter members Timothy J. Kirby, Lloyd Buirows, and Sherman Lambly, Sr.

MATTHEWS, FREDERICK H., 61, member of Local 301, New Britain, Conn., succumbed recently to a heart attack. A former business representative of the Local, he worked in the projection room of the Embassy Theatre in New Britain for the past 35 years.

just a film organization. Anyone in the TV industry has got to be interested in VTR.'" (Statement by Screen Gem's Harry Ackerman to Leo Kovner, Hollywood Reporter, July 18.)

"Network (CBS) is now taping practically all commercials, which results in a saving of 50% over previously-used filmed method, and a need for fewer engineers." (Hollywood Reporter, July 22)

"While present video tape doesn't offer adequate pictorial quality for theatrical exhibition, it's possible that within 5 years electronic developments may bring VTR into theatrical featurefilm field. . . . On production end, electronic filming won't particularly change production techniques or crew size, but substantial savings are possible in time. Especially, instant viewing feature of tape will cut down on callback retakes." (Hollywood Reporter, July 24.)

RCA Fined 100G, Enjoined

A fine of \$100,000 resulting from criminal antitrust proceedings has been leveled against the Radio Corporation of America. RCA also has accepted a consent decree with respect to civil antitrust changes.

RCA was charged with monopolizing and restraining the field of radio and TV equipment through its approximately 10,000 U. S. patents, and has agreed to license its patents individually without restrictions as to the "end use" of the products involved. RCA must place its 100 listed color TV patents in a so-called "pool" and must license them royalty free to all members of the pool.

The complaint charged that RCA achieved its power by amassing ownership of, and rights to use and license others under, approximately 10,000 patents in the "radio purpose" field. "Radio purpose" covers radio and TV apparatus.

Utilitarianism in Extremis

In the 16-mm field, the Debrie auxiliary projector aroused interest; this attachment fits in front of the 35mm. projector to show 16mm. films by the light of the existing arc lamp.

SAFETY-COLOR STANDARDS in the form of enameled, 4½-inch square color samples have been developed by National Bureau of Standards. Samples are to be used primarily as reference standards in photoelectric colorimeters used widely to measure reflectance of opaque color specimens. Colors are named safety red, international orange, safety orange, school bus chrome yellow, safety yellow, safety green, and safety blue.

Recommended Practice

Generally speaking, magnetic sound films can be handled and stored in the same manner and under the same conditions as any other type of safety motion-picture film. The following suggestions should help prolong their useful life.

1. Store magnetic sound films in cans in a cool, dry place.

2. Be eareful with eleaners. Some cleaners may remove or damage the magnetic oxide striping. (See IP, pg. 16, Oct. 1958.)

3. Keep films away from magnets or any other strong electromagnetic field.

4. Clean the projector before and after recording or screening. Some oxide coatings have a tendency to rub off in the projector gate and at the sound heads.

5. Keep the projector amplifier locked in the magnetic- or optical-play position to prevent accidental erasure of the sound track.

6. Avoid getting oil or other liquids on the film. They have a deteriorating effect on the sound track.

7. Project stored films occasion-

ally. It helps relieve winding tensions and prevents film distortion.

8. Make sure stored film is wound evenly on the reels.

Tight Winding Harmful

9. Avoid winding the film too loosely or too tightly on the reels. Loose winding may eause slipping and einehing, with their resultant scratches and abrasions, and winding the film too tightly may cause strains and tension that end in film distortion. — Eastman Kodak Company.

RCA's 7 Projectors, 4 Languages

Motion picture projectors with a four-language sound system were used to present films to delegates attending the recent Atoms-for-Peace Conference at Geneva, Switzerland. Seven RCA 16-mm projectors were installed at the United Nations Building in Geneva, tied in with a special magnetic reproducer with four sound tracks. Earphones and switches were placed at each seat in the auditorium to permit delegates to select the English, French, German or Russian sound track while viewing the picture.

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Strong's 'Blown' Arc Ticket-Buying Aid

ONE OF IP's cherished notions has finally been given practical application by Strong Electric Corp. in the promotion of its new JETARC projection lamp utilizing the ultra-modern "blown" are which has attracted so much attention in projection circles.

Not only does Strong seek converts for this new projection principle among exhibitors and projectionists (witness the recently-concluded Strong Caravan which demonstrated this arc's capabilities in a nation-wide tour) but they also enable exhibitors to go direct to the ticket-buying public by means of an unprecedented public-interest campaign.

How? By furnishing every purchaser of the "blown" arc with a promotion kit containing a series of varied newspaper publicity releases, a radio script, an assortment of newspaper ad mats and proof sheets, glossy photos of the lamp,

a sample of a window card which is available in quantities at cost, and a motion picture trailer which offers on one's own screen a vivid, comparative example of the merits of this arc.

This is the first serious attempt to bring home to those who pay the overall industry bill the *technique* of the process.

Radio-TV's Successful Foray

Guided tours in the radio and, now, the TV stations, whereby the ultimate consumer is afforded an insight into the "technological wonders" of network operatious, have long since been a commonplace in the radio-video area. The Strong organization utilized this effective tool to promote the interests of all who are active in the exhibition field.

By aggressively promoting such a campaign to acquaint the public with not only the "what" of a motion picture's content but also the "how" of its presentation, Strong has not only manifested



Exterior view of Strong Electric's modern "blown" arc projection arclamp.

unlimited confidence in the worth of its product but has reaffirmed its belief in the essential worth and continuing progress of the theatre field.

There has never been within the 27 years' experience of IP when a display of either aural-visual equipment of the delicate nuances of its presentation technique has failed to reward handsomely those with enough acumen to sponsor such a presentation.

HANDLING, PROJECTION OF 16-MM FILM

(Continued from page 8) lenses focuses a greatly reduced and optically aligned image of the singlewire exciter filament directly upon the soundtrack

Because 16-mm contact prints from 16-mm originals are threaded so that the dull side faces the projector lamphouse, and because 16-mm sound-reproducer optics are focused for the normal soundtrack orientation prevailing when the shiny side of the film faces the lamphouse, high-frequency response is somewhat reduced (with possible slight distortion) when 16-to-16 contact prints are played.

Off-standard film orientation poses no sound difficulties for the Kodascope Pageant MK4 projector, however. Attenuation of the high frequencies is avoided at all times in the MK4, whether the soundtrack is on the top or the bottom of the film as it runs over the sound-drum. A "fidelity lever" is provided which shifts the optical



- BRIGHTER LIGHT
- LONGER BURNING
- SHARPER PICTURE

Free Test Samples



- STEADIER LIGHT
- LESS ATTENTION
- PERFECT COLOR BALANCE

Free Carbon Chart

assembly up or down as required for the sharpest possible focus of the scanning beam on the soundtrack.

It may be noted, with regard to the matter of scanning-beam focus, that processed triacetate safety film has a total thickness of 0.0060 inch for black-and-white, 0.0065 inch for color. (Emulsion thickness varies between 0.0005 and 0.0010 inch.) The thickness of the film in the soundtrack area is increased by about 10% when a magnetic striping has been added for home-recorded sound. Accordingly, a reel which has a capacity of 1600 feet of regular optical-track film can hold only 1600 x 90% = 1440 feet of magnetic-track film.

The standard 16-mm frame rates are, of course, the same as in 35-mm projection, namely, 16 frames per second for silent film and 24 for sound. The basic reel size in 16-mm work is the 7-inch reel of 400-foot film capacity. This corresponds to the 10-inch, 35-mm standard reel of 1000-foot capacity. The average "1-reel" roll of 16-mm film is 360 feet in length and runs for 15 minutes at silent speed, or 10 minutes at sound speed.

16-mm sound-film projectors accommodate all the commercially available reel sizes, including the large 1600-ft. (14" diameter) reel for 44½ minutes of continuous showing at sound speed. The more modern projectors can also take the 2000-ft. (16" diameter) reel for 55½ minutes of showtime at sound speed. Although reels should not be overloaded, a full hour's run of sound film (2160 feet) may be safely wound on a 16-inch reel.

Running Times—16- vs 35-mm

Table A translates 16-mm film footage into running time at both sound and silent speeds. Table B translates running time at 5-minute increments into sound and silent film footage. Reel sizes for standard film lengths are

Loew's Split Effected

Loew's Inc.'s board of directors has approved the management plan for the divorcement of film production and distribution from theatre operations in order to comply with a Federal consent decree which stipulated an Aug. 31, 1959 deadline for such a move. Loew's production arm is Metro-Goldwyn-Mayer.

Management's approved plan groups foreign theatres, recording and music assets with the M-G-M studios, while N. Y. radio station WMGM ties in with the domestic theatres.

also indicated. The 16-mm audiovisualist should cut these tables out and pasteboard them for ready reference.

Necessarily, 16-mm prints should be rewound and otherwise worked upon with the utmost care to avoid tearing, creasing, cinching, scratching, and otherwise damaging the delicate narrow film. Microscopic scratches on 16-mm film show up on the screen much more conspicuously than similar scratches on 35-mm prints; dirt is also proportionately more deleterious.

In most 35-mm theatre projectors, the film on the feed reel in the upper magazine has its *emulsion* side facing out, but it winds up on the takeup reel in the lower magazine with *base* side facing out. Film orientation is reversed once again during the rewinding process by passing the film from the *bottom* of the left-hand reel to the *top* of the right-hand reel on the rewinder. Things are different in 16-mm practice.

Because 16-mm projectors wind up the film with the same side out that it had on the feed reel, the film should pass either from the bottom of one reel

to the *bottom* of the other, or from the *top* of one recl to the *top* of the other, when it is rewound.

Never "cinch" the film by pulling down on the free end of a roll to make it tighter, thus scratching the film. Whenever a roll of film is too loosely wound, rewind it over twice at lower speed, or with slightly greater brake tension on the dummy rewinder element. If the projector is used for rewinding, keep the reel-arm spindles, clutches, belts, etc., in good condition at all times, following the manufacturer's instructions with regard to

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lubrication and tension adjustment.

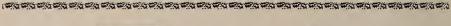
Avoid unwinding film on the floor: clean all lengths of film so mistreated. Short lengths may be cleaned between two soft pads of lintless felt with a volatile, non-toxic, non-inflammable cleaning fluid which does not soften or curl the film. Carbon tetrachloride, without doubt the most effective film-cleaning fluid, is too dangerous for use in cleaning film by hand. Death has resulted from excessive exposure to carbon tet.*

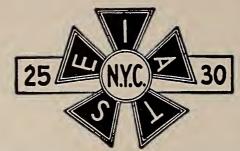
Use a hand-driven rewinding set and draw the film through the moistened pads slowly to give the fluid time to evaporate before the film reaches the reel upon which it is being wound. Keep the pads very moist, and discard them before they have become too dirty and oily.

Long reels of film should be refreshed in film-cleaning machines, not by hand methods. Companies specialize in this work for 16-mm users—in addition to cleaning the film, removing all grime and oil-mottle, they are prepared to "scratch-proof" the film with special lacquer treatments.

Your Choice Anent Splicing

As shown in Fig. 3, the two films to be joined are cut to include a perforation in the overlap area. The emulsion is scraped from the overlap area of the film stub, care being taken to remove the clear gelatine bonding layer next to the celluloid base. If the emulsion is moistened for easy removal, use a sharp razor blade or similar instrument for scraping. A





Haliday Greetings and Urst Wishes to our Many Friends Everywhere

small sandpaper block is used in "dry scraping," a very convenient method.

Apply an ample quantity of triacetate safety-film cement to the scraped area in one brush-stroke, then quickly join the two ends of film in registration, pressing them together firmly for 10 or 15 seconds. Be sure that the safety-film cement is formulated for triacetate film, the only kind of film base now manufactured in 16-mm size. Older types of cement may not work well.

As an alternative to conventional methods, the 16-mm perforated Mylar tape, mentioned earlier, may be used for "butt-splicing" film and repairing torn sections to avoid the necessity for cutting and losing precious frames.

Film Care, Splicing Technique

On the whole, 16-mm film is an excellent motion-picture medium for all non-theatrical uses, and offers the advantage of great equipment portability, compactness, and light weight. (16-mm film has only 2/11ths the weight of 35-mm film of the same running time.)

Much film damage can be prevented

by frequently cleaning the tension gate and sound-drum of the projector. Deposits of hardened emulsion inflict severe scratches on film, and should be scraped from the film-contacting parts with an orangewood fingernail stick or, for the stubborn deposits, a "chisel" of soft copper wire. Do not use steel tools for scraping off emulsion deposits. Steel may scratch the polished surfaces and result in serious damage to the film.

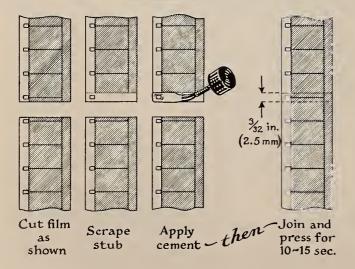
Toothed sprockets, sprocket shoes, idlers, and snubber rollers are best cleaned with a toothbrush *lightly* moistened with kerosene. Lighter fluid (naphtha or gasoline) may also be used if care is taken not to splatter it all over the machine.

Guard against getting oil or fluids of any kind on the sound lenses, exciting lamp, or photocell!

The perforations of 16-mm film are not as durable as those of 35-mm film; there aren't so many of them! Moreover, the use of claw-intermittent movements contributes to perforation wear. Although claw-shuttles are extremely precise in pulldown action, they have a tendency to become hooked. When a hooked claw disengages from the film, it literally "saws" across the edge of the perforation, tearing it.

RCA "400" 16-mm projectors have Stellite steel pulldown claws which do not wear into a hook shape, and never need be replaced because of wear. The Kodascope Pageant projectors employ a claw-tooth of tungsten carbide, one of the hardest substances known. This is also "hook-proof."

The art of splicing 16-mm film should be mastered at the outset. A good splicing block should be used, inasmuch as hand-made splices are seldom evenly scraped or perfectly registered. The width of the overlap varies, depending on the make and type of splicer used, but 3/32 inch (2½ mm) is customary.



Steps involved in splicing 16-mm film. Note that the film is not cut on a frameline, as in 35-mm practice.

FIGURE 3

^{*} See excerpt from Journal of the SMPTE (Sept., 1958, Vol. 67), for exhaustive presentation of film-cleaning agents, tables from which, with explanatory note, appear on page 14.

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oughly every aspect of motion picture projection, presenting his material in easily understood language—not too technical, yet technically accurate. Manual is divided in 8 sections and contains 30 chapters — a valuable reference work no progressive projectionist should be without.



= SECTION HEADINGS =

- (1) Film; (2) The Projector; (3) Projection-Optics, Screens; (4) The Arc Lamp;
- (5) General Projection Practice; (6) Motors, Generators, and Rectifiers; (7) Sound Reproduction Systems; (8) Projection of Color and 3-D Films, Formulas.

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